I'm not a bot

F major is a chord that has the notes F, A, and usually C. Those notes, placed in the same octave, instrument, dynamics, etc., should have basically the same acoustical properties each time it's played, but human perception of this chord can seem to vary dramatically depending on the context the chord is placed in. One of the most powerful contexts that can give the same isolated sound remarkably different meanings comes from its surrounding key. Roman numeral analysis is a way to identify certain similarities in tonal music (whether classical, folk, or popular) that have traditionally been assigned to different chords that appear on the same scale degrees in different keys. Let's create an F-major chord but convert it to roman numerals in a few different contexts by creating different key objects. First the setup: from music21 import * f = chord.Chord('F4 C5 A5') kf = key.Key('F') sf = stream.Measure([kf, f]) sf.show() kc = key.Key('C') sc = stream.Part([kc, f]) sc.show() kb = key.Key('B') sb = stream.Part([kb, f]) sb.show() Now that we have four different keys, let's create Roman numerals from the F major chord and each of the keys. We will use a function from the music21.roman module called romanNumeralFromChord() (which we saw briefly in Chapter 10). We pass to this function a Chord object and a Key object. rf = roman.romanNumeralFromChord(f, kf) rf rc = roman.romanNumeralFromChord(f, kc) rc Music21 tries its best to find a Roman numeral for almost any combination of chord and key, even if, like in B major: rb = roman.romanNumeralFromChord(f, kb) rb Each RomanNumeral object has some common properties, such as .figure, .figureAndKey, .romanNumeralAlone, .key, and .scaleDegree: (rf.figure, rc.figure, rb.figure) (rf.romanNumeralAlone, rc.romanNumeralAlone, rb.romanNumeralAlone) (, , ) (rf.scaleDegree, rc.scaleDegree, rb.scaleDegree) Note that in the last case, the scale degree is the uninflected degree – the flat sign isn't included in the .scaleDegree tag. For that, use .scaleDegreeWithAlteration rf.scaleDegreeWithAlteration rb.scaleDegreeWithAlteration (5, ) Or look at the .frontAlterationString, frontAlterationAccidental, and frontAlterationTransposeInterval rb.frontAlterationAccidental rb.frontAlterationTransposeInterval Of course, some RomanNumerals make more sense than others, so there's a .functionalityScore which returns a number from 0 to 100 as a rough approximation of how "functional" this chord is: (rf.functionalityScore, rc.functionalityScore, rb.functionalityScore) As I hinted at above, RomanNumeral objects are Music21Objects so they can be put into Streams and showed: s = stream.Measure() s.insert(0, rf) s.show() Note that the spacing of the roman numeral is preserved from the chord that it was converted from. If we create a RomanNumeral object directly, then it is created in closed position above a tonic note in octave 4: rf2 = roman.RomanNumeral('I', kf) rf2 It is possible to pass in just a roman numeral ("I", "ii", "iii", "IV", etc.) and a string ("C" = C major, "c" = c minor) to create a RomanNumeral object: subDom7 = roman.RomanNumeral("IV7", "B-") subDom7.show() e65 = roman.RomanNumeral("ii65", "E") e65.show() For these romanNumerals, there is information after the .romanNumeralAlone this can be found as a string in .figuresWritten: (subDom7.figuresWritten, e65.figuresWritten) These numbers can also be found as part of a more powerful figuredBass.Notation object (to be discussed later) in the .figuresNotationObj attribute: (subDom7.figuresNotationObj, e65.figuresNotationObj) (, ) e65.figuresNotationObj.numbers Many of these properties can be changed: rf.key = key.Key('D') rf.show() Changing the key removes any information about pitch spacing. You can't have everything. :-) We'll put the key of F back and the original pitches before we forget: rf = roman.romanNumeralFromChord(f, kf) A RomanNumeral object is a subclass of a Chord object, therefore we can do everything with them that we could do with a chord. For instance: rfc = rf.closedPosition() rfc.show() rb.lyric = rb.figure rb.show() (rf.quality, rc.quality, rb.quality) ('major', 'major', 'major') e65.semitonesFromChordStep(7) That's all we have for RomanNumerals for now – we will return to RomanNumeral like objects later when we look at other Harmony objects such as ChordSymbols and FiguredBass and we look at the romanText module. But we'll take a break from musical objects and get acquainted a bit better with how your system works when running music21 with a look at Chapter 24, Environment. Thus far, we have focused on the building blocks for constructing music such as pitches, intervals, chords, and melodic interaction, but we have yet to look at how these elements combine to create harmony. To study harmony, we need a tool that describes chords and sonorities based on their function rather than their components. To this point, we have used leadsheet notation to convey the essential components of a chord: root, bass note, quality, inversion, and any additional pitches. But a single leadsheet chord does not provide context about its role in the music. Cmin7/E-flat From this, we know that the chord has the pitches C, E-flat, G, and B-flat with the E-flat as the lowest voice, but we do not know how it relates to the chords around it. Is it stable, and does it sound final? Or is it unstable and pulling toward a different chord? When music theorists want to discuss diatonic (key-based) function, we label chords using a Roman numeral system based on the chord's position within a particular key. Goals for this topic Using the examples below, determine: what are the diatonic qualities of all triads and seventh chords in major and minor If we consider these examples to be "diatonic", does every quality occur naturally or do some require accidentals? What is the relationship between chords in major and minor? how Roman numerals are created and labeled What information does each part (e.g. Roman numeral, lower-case vs. upper-case, inversion figures, etc.) of the Roman numeral convey? Are the inversion figures identical to the figured bass discussed in the class reading from this unit? If not, how do they differ? How do leadsheet notation and Roman numerals differ in the information that they convey? Note that the ABC notation used in these examples has limitations on what kind of text can be entered. In the Roman numeral system, everything other than the Roman numeral itself should be written as superscript. Conclusions You may already be familiar with the basics of using Roman numerals for labeling diatonic chords, but it is helpful to have a complete breakdown of the system into its fundamental components. Root - The number (e.g. one, two, three, etc.) associated with a Roman numeral denotes the scale degree on which the chord is built. If there is no accidental in front of the Roman numeral, the chord is built off the diatonic scale degree. The only exception to this rule are the viio and viio7 chords in minor, which are both built off of ti (raised seventh scale degree) but will not have a "#" placed in front of the Roman numeral. We will discuss the reasoning for this in detail over the next couple of units, but to have its standard dominant function in diatonic harmony, the viio chord must contain ti. Because of this requirement, we skip using the normal root alteration in our Roman numeral analysis as a shorthand. The naturally-occurring VII chord is used much less and has a more limited scope in common practice. If there is an accidental in front of the Roman numeral, this affects only the root of the chord by raising or lowering it. Chordal third - The case (i.e. upper-case versus lower-case) of the Roman numeral denotes the quality of the chordal third. All upper-case Roman numerals have a major third. This includes major triads, augmented triads, major major (major 7) chords, and major minor (dominant 7) chords. All lower-case Roman numerals have a minor third. This includes all minor triads, diminished triads, minor minor chords, diminished minor chords, and diminished diminished chords. Chordal fifth - The chordal fifth is altered by adding either a o (the diminished symbol) for lowered fifths or a + for raised fifths. Chordal sevenths - To show a chordal seventh is present, you only need to use an inversion figure that implies a seventh chord (i.e. 7, 6/5, 4/3, or 4/2). A seventh chord inversion figure with no alteration implies a minor seventh above the root. It may be helpful to think of this as the "default" chordal seventh. Having a minor interval as default is different than chordal thirds and fifths, because both of those chord members have "defaults" of a major interval. We do this for two reasons: We cannot raise a M7 above the root; it just becomes the root. A d7 would be lowered twice if we used a M7 as default, and we would have to devise a new system for showing this. A M is added before the inversion figure for all major seventh chords, even though they do occur diatonically. This allows us to differentiate chord qualities clearly once secondary functions and mode mixture are introduced later in the course. Non-diatonic harmonies are common enough that the Roman numeral system must be able to clearly distinguish them while retaining its clarity. The diminished symbol, o, is added before the inversion figure for fully diminished seventh chords. This also shows that the chordal fifth is lowered, the same as in a triad. If you think of a m7 above the root as the default chordal seventh for inversion figures, then adding o lowers the chordal seventh by a half step. As you know, half diminished seventh chords (diminished minor chords) have a lowered fifth above the root but a minor seventh, rather than the diminished seventh of a fully diminished seventh chord. For half diminished chords, we replace the o with a ø to show that the chordal fifth is lowered but the chordal seventh is a m7 above the root. Remember that when you add an inversion to a seventh chord, you do not need a 7 anymore. The inversion implies the seventh. By having each part of a Roman numeral describe an isolated chord tone, we are able to accurately describe any chord that can occur in our tonal harmony system, regardless of whether it has a standard function. Chordal member Default implied pitch To raise by semitone from default To lower by semitone from default root diatonic scale degree sharp symbol in front of Roman numeral* flat symbol in front of Roman numeral* third based on case of Roman numeral upper case (M3) lower case (m3) fifth P5 above root + after Rom num o after Rom num seventh m7 above root M before inversion figure o before inversion figure** *For clarity's sake, we always use a sharp or flat symbol to show that we are raising or lowering the root, even if you are actually adding a natural. When analyzing pieces that change keys–especially to distant keys–this makes it much easier to look for similar patterns, regardless of whether the key signature uses sharps or flats. **Because the diminished symbol o implies the interval of a d5 AND a d7, you must use the half-diminished symbol if you wish to alter the fifth but leave the chordal seventh as a m7 above the root. There are two more possible additions for Roman numerals, but these are advanced techniques are will not be necessary until Unit 19. For completeness, we will discuss them here, but if you would rather skip this for now, please do so. The word add is used when a tone is a functional part of the chord but does not belong to a standard triad or seventh chord. A good example of this would be a triad that has a functional 9th above the root. For example, in C major, if a C major triad were to have a D as necessary to the function of that chord, it would be labeled Iadd 9. This clearly identifies the triad plus the additional ninth, but it also omits the chordal seventh. If it were a major seventh chord, you would not need use the add function, because a 9 would imply everything below it. So a IM9 is assumed to have 9th, 7th, 5th, and 3rd above the root. The word sub is used when a tone replaces another chord tone. The replaced chord tone is always the closest chord tone below the subbed chord tone. For example, if the tonic triad in C major had a 4th above the root instead of the chordal third, you would label that as Isub4. This implies that the 4th replaces the chord tone directly below it, so this would be a triad with C, F, and G. Let's say you are the Batman of songwriting. You have all the moves. Your chords, scales, pentatonics, knowing how to write melodies, etc are your kicks, punches, chokeholds, grapples, etc. Another huge tool in your belt must be to be able to do Roman Numeral Analysis. Why? Because it will help you make sense of the chord progressions in songs, so this is an invaluable skill to have. It's Batman's ability to assess a situation and act strategically. Ok enough with the Batman reference, you get the idea. But what is this analysis we speak of?Roman Numeral Analysis is a system for analyzing the harmonic structure of a song by identifying what chords make up the chord progression, what key they fall into, and assigning each chord a Roman Numeral from one to seven depending on the scale degree the chord is built from.In plain english, you put a number from 1-7 to each chord in a key, then look at what the combination of numbers is in your chord progression in that key.Let's look at the example below and you'll see how simple this actually is. First we have our chords. To keep things simple I'm going to just go ahead and tell you this progression is in the key of C.So we know the key is C. All the possible chords in the key of C (in order) are the below:Since Cmaj is the first chord (of the C Major key), it is the "one" chord. Dmin would be the "two" chord, and so on. So let's use Roman Numerals to label them. Major vs Minor chords in Roman NumeralsNow, how do we label Major chords differently from Minor chords so we know which is which? Well Major chords will be uppercase and Minor chords will be lower case.As you can see some of the chords are Major and some are Minor and that last chord is diminished. This Roman Numeral formula is the same for ALL Major keys and each chord in the key has a number assigned to it. Back to our example chord progression. Let's analyze it. We just have to check what the chords of the progression were and see what numeral they have in the key of C Major. And there you have it. You just did Roman Numeral Analysis. BOOM. This is of course a very simple example, but I want you to wrap your head around it easily. It can get more complicated than this when it comes to analyzing chord progressions that are not all in one key. But that's a topic for another day.If you're reading this article I assume you're just getting acquainted with music theory, so I really don't want to bog you down with tons of theory in one post because it might just confuse you. I'd rather make a separate article on how to find the key of a song. So stay tuned and I'll probably link it here later if you do want to go deeper. Two quick hacks for finding the key of a songA good rule of thumb for many many modern songs is that the first chord of the song will likely be the key of the song. So if the first chord is Cmaj, it's highly likely the key is C Major for the whole or most of the song. In some songs they might use the root chord of the key as the first chord in the chorus though, so that's another possibility. They do this because putting the root chord of the key at the beginning of the song sets the tone for the rest of the song so the rest of the chords feel like you are "departing" from that feeling of home. When the root is in the first chord of the chorus, the intention is to make you feel like you arrived home when you hit the chorus. It helps emphasize that it is the main idea/point/message of the song. Songs with borrowed chords or key changesSometimes there may be 1 or two chords that don't fall into the key of the first chord of the song, but that could just be a chord borrowed from another key or there might be a key change for the bridge of the song. This is pretty common. What you want to look out for is, which chord feels the most like "home", like that feeling that you arrived where you were trying to go with your chords. So those are some things that can give you a quick general idea of what the key of the song might be. You can always Google what the chords are for the key you think it is and see if most of the chords are in it. Like I said, I'll make a separate article about finding the key that will go deeper and be more helpful. Stay tuned. Roman Numeral Analysis uses symbols to indicate certain aspects of a chord in a progression. It can tell you things like whether it is Major, Minor, Seventh, Dominant, Augmented, or Diminished. Here are the symbols and what they mean:Uppercase Roman Numeral (such as IV) means it's a Major triad chord.Lowercase Roman Numeral (such as ii)means it's a Minor triad chord. A superscript "o" (such as viio) means the chord is Diminished.Uppercase Roman Numerals with a "+" sign (such as V+) means it's an Augmented chord. Uppercase Roman Numeral chords with a superscript "7" (such as V7) means it is a Dominant 7th chord. Lowercase Roman Numeral with a "7" (such as ii7) means it is a Minor 7th chord. Lowercase Roman Numeral with a "ø" (such as viiø7) means half diminished and "o" (such as viio7) means fully diminished.Roman Numeral Analysis and the Nashville Number System both serve the same purpose, which is to help analyze the chords in a song. The key difference is that the Nashville Number System uses Arabic numbers (like 1, 2, 3) instead of Roman numbers (I, II, III). This is to make it easier to communicate between musicians as Arabic numbers are more commonly used than Roman numerals in everyday life.They also have slightly different symbols such as using a "minus" sign (-) or a lowercase "m" to indicate a chord is minor. The Nashville Number System is a shorthand. It's like slang for Roman Numeral Analysis to make it easier to read and communicate. The Nashville Number System uses many of the same symbols as Roman Numeral Analysis to describe chords. These are:A number with no symbols (such as 2) means it's a Major triad chord.A number with a "-" symbol or a lowercase "m" (such as 2m) means it's a Minor triad chord. A superscript "o" (such as 7o) means the chord is Diminished.A number with a "+" sign (such as 5+) means it's an Augmented chord. A number with a subscript "7" (such as 57) means it is a Dominant 7th chord. A number with a dash and a superscript "7" (such as 2-7) or an "m" and superscript 7 (such as 2m7) means it is a Minor 7th chord. A number with a "ø" (such as 7ø) means half diminished and "o" (such as 7o7) or "dim" (such as 7dim) means fully diminished.This might help you if you are just getting into music theory and want to know why you should even bother learning it in the first place. When we understand why it's important, it helps us open up to it so it doesn't feel like it's such a chore, and feels more like learning a cheat code to make your life easier. Roman Numeral Analysis is important because it is a tool for analyzing the chords of a song. It allows us to label and understand the relationships between chords in chord progressions and musical compositions.This can help us understand why songs and compositions work or don't work to create better songs and chord progressions that flow seamlessly. It also helps to communicate how a song is written to other musicians and collaborators in the studio or while practicing for a gig. Analyzing The Building Blocks of A SongThe first (and arguably the biggest) benefit of understanding Roman Numeral Analysis is because it helps you analyze how the chords are building the song depending on what key the song is in. You'd be surprised how logically many songs are built. Simple songs can often be formulaic and mathematical. You can see this in a lot of pop songs which tend to stay in one key, use common chord progressions and often have a very cookie cutter structures. With Roman Numeral Analysis we can assign numbers to the chords used in a song. So we could say a song is using for example, the first, fifth, sixth, and fourth chord of a Major key in that order. This is actually a really common combination. It's known as the Pop Song Chord Progression. It's not the only one though, there are many combinations that have become common chord progressions and knowing Roman Numeral Analysis helps us see those common combinations. It lets us see the building blocks of a song as far as chords go. Analyzing Patterns in an Artist's SoundAn artist "having a certain sound" could mean a lot of things. It could mean their production, the instruments they use, their stylistic preferences in how they play their instruments…AND it can also mean that they use the same chord progressions in multiple songs but in different keys (so we don't notice). Sometimes specific changes from one chord to another in progressions can become a part of their sound and with Roman Numeral Analysis we can see those patterns in an artist's chord progressions. This gives us insight into their sound and their songwriting choices.Analyzing Historical Periods or Genre-wide PatternsAnother big benefit of Roman Numeral Analysis is this insight can help pinpoint specific patterns in an entire historical period (like with Baroque classical music) or an entire genre (like with Pop music or Jazz). Being able to see these patterns allows us to appreciate the differences and nuances of each era and genre.Helps to Teach MusicRoman Numeral Analysis is a great tool to teach people music. It's really a huge communication tool so that not only can you understand how a song is built, but you can teach someone else about it. This is obviously helpful for a teacher and student of music, but it can also be helpful for teaching bandmates, producers or other collaborators how a song is built so that you can play it together, or work on improving it together. So all musicians can benefit from this.Helps to Write Better SongsIn addition to understanding a song, my favorite benefit is being able to use this type of analysis to write better songs. How does it help you write better songs?Identify and troubleshoot Chord Functions: You can see how the chords are flowing from one to another and see if there are issues with chord functions (how seamlessly chords flow into each other). If you're unfamiliar with this concept check out this post Chord Function: The Compass to Flowing Chord ProgressionsIdentify overused chord progressions: If you write a lot of songs you might start to use the same chord progressions for each one but just in different keys. While there is nothing wrong with this, if you overdo it, your songs will all start to sound the same. You might not know why until you realize it's because you're doing the same thing in different keys too often. Identify what chords you could substitute for other chords: This could mean changing one of the chords from major to minor or vice versa. It could also mean changing one of the chords for a chord from a mode (if you don't know about this check out this article How to Write Songs Using Modes. As you can see, learning Roman Numeral Analysis is VERY helpful. This is one of those concepts that serves as a main pillar in your understanding of music and your improvement as a songwriter/composer. This will bridge the gap between theory and practice as you write songs so make sure you don't skip it.If this was helpful, how about subscribing to the Youtube channel for more? Share — copy and redistribute the material in any medium or format for any purpose, even commercially. Adapt — remix, transform, and build upon the material for any purpose, even commercially. The licensor cannot revoke these freedoms as long as you follow the license terms. Attribution — You must give appropriate credit , provide a link to the license, and indicate if changes were made . You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use. ShareAlike — If you remix, transform, or build upon the material, you must distribute your contributions under the same license as the original. No additional restrictions — You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits. You do not have to comply with the license for elements of the material in the public domain or where your use is permitted by an applicable exception or limitation . No warranties are given. The license may not give you all of the permissions necessary for your intended use. For example, other rights such as publicity, privacy, or moral rights may limit how you use the material. Roman Numeral Analysis is a valuable technique for analyzing the chords and progressions in a piece of music. You can use it to transpose the standard progressions, like the circle of 5ths progressions or blues, to any key.In this article, you can learn about Roman numerals, their notations for triads, 7th chords, chord qualities, inversions, and the stepwise method of analysis of harmony of any given section of music with examples.Read the complete article to know in depth about the Roman Numeral Analysis!What are Roman NumeralsMost of you would have studied Roman Numerals in your primary school in the Maths class. It is a system developed by the Ancient Romans that use letters like I, V, X, L, C, D, and M and their combinations to represent the numbers. You don't require all these letters, and just I and V are enough for all musical representations.History of Use of Roman Numerals in MusicThe earliest documented use of Roman numerals is found in the second part of the 18th century. But Gottfried Weber, in the 1820s, is considered to have made use of Roman numerals popular through his Theorie der Tonsetzkunst (or Theory of Musical Composition).Specifically, he started using Capital numerals to designate the major chords and the lowercase ones for minor chords. He introduced the superscript symbols 'o' for the diminished chords and '7' for the seventh chords.What are Roman Numerals in Music Theory?Roman numerals are used in music theory to designate the scale degrees and the chords based on them. Many texts use Arabic numerals with carets to denote the scale degrees themselves. In the Roman numeral system, the chords are designated as I, II, III, IV, V, VI, and VII in the roman numerals.What do Roman numerals in chords mean?The Roman numerals in the representation denote the scale degree names of the root note on which the particular chord is built. The Roman numerals represent the whole chords, not just the root. The I represents the tonic chord; the IV represents a subdominant chord, V is a dominant chord, and so on.For example, the I chord in the key of the C major means that the chord is built on the first scale degree note of the C major scale and represents the tonic C major chord.Similarly, the V chord in C represents the dominant G chord built on the fifth scale degree of the scale. In simple terms, the Roman numerals represent the scale degree names of a scale on which the chord's root is based.But what is important to understand is that the representation itself is independent of any particular scale. The IV chord in C major scale represents the F Major chord built on the fourth scale degree as the root, but the same notation will mean the G major chord in the key of D.Roman Numerals and Chord QualityRoman numerals do not just represent the scale degrees of the root of any chord.They are designed to provide other information about the chords, like their sonorities or chord qualities, which allows you to distinguish between the major and minor chords, identify an augmented or a diminished chord, a 7th chord, an inversion in conjunction with the figured bass notation, and the secondary functions.Uppercase Roman Numerals Vs. Lowercase Roman NumeralsThe case of Roman numerals is used to distinguish between the major and minor triads. An uppercase roman numeral represents a major triad, while a lowercase roman numeral denotes a minor triad.For example, in G major key, the I chord represented in the capital notation notates a G major Chord. The ii chord represents the A minor chord with notes [A C E], built on the second scale degree of the G major scale.In the G minor key, the i chord represents the G minor, as a lowercase roman numeral shows it. The iv chord in G represents the D minor chord.Augmented and Diminished SymbolsAs you know, four types of basic triads can appear in your chord progression. You have seen the notation for the minor and major triads so far. Let us now look at the notation of the diminished and the augmented chords.A diminished triad occurs on the seventh scale degree in a major scale and on the 2nd degree in a natural minor scale. They are denoted by scale degrees in the lowercase numerals followed by a small "o" as a superscript. Hence, the representation of diminished triads is viio in major keys and iio in minor keys.An augmented triad does not occur naturally in the diatonic scales. It normally originates as the third triad in the harmonic minor scale or the melodic minor scale, where it is designated as an III+ chord.But we can have them in a major or minor scale with a chromatic alteration, as a borrowed chord. A plus sign usually denotes augmented triads after the upper case Roman numerals. For example, if the 5th in C major chord is altered to G#, the resulting C augmented chord is notated as C+.Roman Numerals and Seventh Chord QualityThe 7th chord is denoted by the number 7 in a superscript above the roman numerals. For example,The I7 denotes the tonic major seventh chords in major scales,The vi7 denotes the submediant 7th minor chords in major scales.The i7 represents the tonic 7th minor chords in minor scales.The V7 represents the dominant 7th chords in both major and minor scales.The I+7 represents the chromatically altered tonic augmented chord.The diminished 7th chords have a slight variation in their roman numeral representation from the diminished triads because they are two types – the half-diminished 7th and the full-diminished 7th.The half-diminished 7th chord is represented by the symbol viiø7, while the full diminished has a similar notation to the triads with an additional '7' superscript, viio7.Chord Inversions in Roman NumeralsA combination of the roman numerals and the figured bass symbols notates the chord inversions. The roman numerals indicate the chord name, chord quality, and the scale degree numbers of the roots. The figured bass symbol on the sheet music tells you the inversion you need to play the chord in.For example, the I, I6, and I6/4 represent the tonic triads in their root position, first and second inversions. Similarly, for the subdominant chord in a major scale, the upper case numerals IV, IV6, and IV6/4 represent the parent and the inverted chords.Similarly, the 7th chord representation for inversions is.V7 represents the root position,V6/5 is used for the 1st inversion,V4/3 for the 2nd inversion, andV4/2 is the 3rd inversion.Representation of the Secondary FunctionsThe secondary chords are built to tonicize chords major/minor chords in any key other than the tonic chords. For example, if you want to tonicize the ii chord of a major scale, you can useIts secondary dominant chord, which is represented as V/ii (triads) or V7/ii (7th chords) in the roman numeral notation, orIts secondary leading tone chord is represented by viio/ii or viio7/ii.Diatonic scalesYou may know the process of harmonizing any scale. It involves the addition of two notes above each scale degree of the scale, resulting in the formation of the triads. Such triads represent root position diatonic chords of the key. The table below shows them.Each type of scale produces a typical triad quality pattern which remains the same for that particular scale type. This is because each scale has a particular pattern of intervals (whole steps, half steps, or others) between the notes. It is advantageous if you know and remembers the qualities or the sonorities of the chords.Major Scale Roman NumeralsThe chord quality pattern for any major scale is given below in the table. As stated above, the pattern is consistent for major scales. Chords ii, iii, and vi in any major scale will be minor chords. This aspect of any scale makes the Roman numeral analysis more powerful, as we will discuss later.Roman Numerals for Minor ScaleThe pattern for the natural minor scale is given in the table below.However, a natural minor scale has a subtonic 7th scale degree instead of a leading tone. This results in minor v and major VII chords rather than the dominant V chord with a strong resolution to the tonic. So, we normally use these chords from the harmonic minor scale, with the raised 7th resulting in the V and viio chords instead of v and VII. This is shown in the table below. The iio chord leads to a half-diminished 7th chord, while viio leads to a fully diminished 7th chord.Triads of the Seven Modern ModesThe triads formed by the harmonization of the seven modes (Ionian, Dorian, Phrygian, Lydian, Mixolydian, Aeolian, and Locrian) of the major scale are shown in the table below.Don't be confused by the nomenclature in the table above, as all designations are shown relative to the major scales (Ionian mode). Thus, relative to C Ionian mode, where ii is a D minor chord, a C Phrygian mode will have bII, which is a major chord with Db as its root note.Use of different notations of the Roman NumeralsSome authors and composers use slightly different variations of the numerals. Let us just briefly apprise you of the same so that you can derive the meaning if you encounter them.You may see only uppercase roman numerals with an additional symbol like a lowercase 'm,' 'o,' or 'ø,' or '7'. For example, IIm or VIIo for the minor and diminished chords in a major scale. An upper chord symbol with any symbol following it means it is not a major chord.You may see symbols like V9, V11, and V13 in the jazz context.You may see symbols a, b, and c after the Roman numerals to indicate the inversion. This is particularly true for the United Kingdom. Ia, Ib, and Ic represent the tonic chord in root position, first inversion, and second inversion, respectively.Why is Roman numeral analysis important?In Western music, Roman numerals are used also to represent the chord progressions of any composition independent of the key. These are abstract chord progressions without being fixed to a particular key. This allows you to transpose the progression to any key.For example, consider the popular jazz progression ii-V-I. In the key of C, the progression means Dm – G – C, which is equivalent to the predominant (supertonic) – dominant – tonic, as per the circle of fifths. In the key of A, this will mean a Bm – E – A progression.You often have instruments in a band that can play specific keys only, like the B-flat clarinet and an E-flat saxophone. They can play the progression based on the roman numerals provided in their key from the same sheet music.The Roman numerals allow you to identify the chords in the context of any given key signature and analyze the harmony of the composition. The analysis includes identifying the quality, inversions, extensions, etc. Once the chords and their inversions are identified, you can deduce back the chord progressions to help you play them easily.Analyzing with Roman NumeralsWith all this background, let us now delve into the main topic of how to analyze the Roman numerals you encounter on sheet music. The steps are detailed below:You need to establish the key of the section of the music first. If the key signatures are given, identifying the key becomes relatively easy. But you still need to differentiate between the relative pairs that carry the same key signatures. This is usually done by examining the first and the last measures on the sheet music. In most cases, the piece of music will begin and end with the tonic chords.If the key signature is not explicitly given, you must establish it by looking at the notes and their accidentals.Once you have established the key, the next step is to find out the root of each chord. You may have first to distinguish whether you have a triad or a 7th chord by looking at any doubled notes. Then use your knowledge of diatonic numbers in the figured bass to establish the root.Establish the sonority of the chord – Major, Minor, Dominant, Diminished, Augmented from the notes of the chord.Fins the place of the chord in the scale by the scale degree of the root and its quality and assign it a Roman Numeral accordingly.Take care to include the symbols for diminished, augmented, and 7th chords appropriately.Include the figured bass numbers in the representation to indicate the inversion correctly.Examples of Roman Numeral AnalysisLet us carry out the Roman numeral analysis of the diagram given below to understand the concepts and steps more clearly.The detailed analysis follows the steps indicated in the previous section.The key signature for the piece of music is given, and it has three sharps. The key could be A Major or F# minor. The notes with sharps in these keys are F#, C#, and G#.We note that there are seven chords in the piece of music. Let us proceed and identify the chords at the beginning and the end to zero down at the exact key.The first chord has notes [F#, C#, F#, and A]. It has three distinct notes, F#, C#, and A, so it is a triad [F#, A, C#]. It has intervals of m3 and M3. Hence it is an F# minor chord.The last chord has notes [F#, A, C#, and F#]. It is also a triad with the same notes as in the last step. We know that it is an F# minor triad. Since both the first and last chords are F# minor, we can safely conclude that it is the i chord, and F# minor is the key of the piece of music. Let us now analyze the balance chords in the same way.The second chord has notes [E#, C#, G#, and C#]. Here E# is in the bass. The diatonic numbers from the E to G# and C# are 3 and 6 (since G# is at the interval of a third from E# and C# is at a sixth interval). Hence this chord is in the first inversion, and E# is a third of the chord. So the chord is a triad with the notes [C#, E#, and G#], which is a V chord (C# major) since C# is at the 5th scale degree of the F# minor scale.Observe that the scale given is F# minor, with E as a natural seventh-degree note. It has been raised to E# to form a dominant V chord by placing the # symbol over and above the key signature.The third chord has notes [F#, A, F#, and C#]. We know from above that it is an F#m chord. So, we have i – V6 – i, progression so far.The fourth chord has notes [D, B, F#, and B]. From bass D, the diatonic numbers are 3 to F# and 6 to B, so it is a 1st inversion triad with doubled B. So the given chord is a minor chord [B, D, F#] in the first inversion, iv6.The fifth chord carries notes [C#, C#, F#, and A]. The diatonic numbers from the bass C# are 4 (to F#) and 6 (to A). So the chord is the tonic chord in the second inversion, i6/4.The 6th chord has notes [C#, C#, E, G#]. We know from step 5 in our analysis that it is a V chord, but this time in the root position.So the overall progression for the piece of music is i – V6 – i – iv6 – i6/4 – V – i. It is shown below in the updated diagram.ConclusionWe hope, our article on the Roman numeral analysis has given you valuable insights into how to represent chords using roman notations and analyzing the harmony of any given piece of music. Still, if you require any clarifications or want to share your valuable experiences, please provide comments in the section below. Samuel Brady and Kris Shaffer Roman numeral analysis is a system of chord labels that contextualize a chord in relation to the overall key of a piece. The number represented in the Roman numeral corresponds to the scale degree of the chord's root. If the chord has a seventh, a superscript seven (7) is added to the Roman numeral. The quality of a chord is also indicated in Roman numeral analysis: Chords with a major third above the root (major, augmented) uses a capital Roman numeral. Chords with a minor third above the root (minor, diminished, half-diminished) use a lowercase Roman numeral. Special symbols are added for augmented (+), diminished (o), and half-diminished (ø) chords. Musicians use Roman numerals to identify chords within the context of key signatures. Roman numerals identify the scale degree of the chord's root (Example 1). Because Roman numerals are based on scale degrees rather than specific pitch names, they are useful for understanding how harmonies function similarly in different keys. Scale degree Uppercase Roman Numeral Lowercase Roman Numeral 1 I i 2 II ii 3 III iii 4 IV iv 5 V v 6 VI vi 7 VII vii Example 1. Scale degrees and Roman numerals. Example 2. The difference between handwritten and typed Roman numerals. To type uppercase Roman numerals, use the uppercase Latin alphabet letters "I" and "V"; likewise, for lowercase Roman numerals, type the lowercase "i" and "v." Handwritten uppercase Roman numerals have horizontal bars across the top and bottom of the numeral, in order to further distinguish between uppercase and lowercase (Example 2). There is no such difference with lowercase Roman numerals. Roman Numerals and Triad Quality Roman numerals indicate three things: the scale degree of a chord's root, the quality of the chord, and the chord's inversion (see Inversion below). The number represented by the Roman numeral (see Example 1) corresponds to the scale degree of the chord's root in whatever key the music is in. Uppercase Roman numerals denote major triads, and lowercase Roman numerals denote minor triads. For example, in a major key, a chord built on the first scale degree, [latex]\hat1[/latex] or do, is identified as "I," and a chord built on the second scale degree, [latex]\hat2[/latex] or re, is identified by the lowercase Roman numeral "ii." Lowercase Roman numerals followed by a superscript "o" (such as viio) represent diminished triads. Uppercase Roman numerals followed by a + sign (for example, the rare V+) represent augmented triads. In the analysis of Western music, Roman numerals are generally placed below the bottom staff. Some music theorists prefer to use only uppercase Roman numerals, a system which assumes chord quality is intuited; in this textbook, we privilege the distinction of triadic qualities as denoted by uppercase and lowercase Roman numerals. Example 3 shows the triads and seventh chords of a G major scale, labeled with chord symbols and now Roman numerals (in blue). The solfège and scale degree of the roots are also labeled. Example 3. Roman numerals of triads in major and minor keys. The Roman numerals and qualities of triads in major keys are as follows: I: major ii: minor iii: minor IV: major V: major vi: minor vii°: diminished The Roman numerals and qualities of triads in minor keys are as follows: i: minor ii°: diminished III: major iv: minor v: minor V: major (raised leading tone) VI: major VII: major vii°: diminished (raised leading tone) Note that the quality of v/V and VII/viio differs depending on whether or not the leading tone is raised. Roman Numerals and Seventh Chord Quality Roman numeral labels for seventh chords add a superscript 7: for example, V7, ii7, and viio7. The capitalization of the Roman numeral depends on the quality of its triad: uppercase for a major triad (e.g., V7), lowercase for a minor or diminished triad (e.g., ii7). Half-diminished and fully diminished seventh chords, which both contain a diminished triad, are distinguished by an additional symbol after the lowercase Roman numeral: ∅ for half-diminished (e.g., vii∅7) and o for fully diminished (e.g., viio7). Example 4 shows the triads and seventh chords of a G minor scale labeled with chord symbols and now Roman numerals (in blue). The solfège and scale degree of the roots are also labeled. Example 4. Roman numerals of seventh chords in major and minor keys. The Roman numeral and qualities of seventh chords in major keys are as follows: I7: major-major seventh (major seventh) ii7: minor-minor seventh (minor seventh) iii7: minor-minor seventh (minor seventh) IV7: major-major seventh (major seventh) V7: major-minor seventh (dominant seventh) vi7: minor-minor seventh (minor seventh) vii∅7: half-diminished seventh The Roman numeral and qualities of seventh chords in minor keys are as follows: i7: minor-minor seventh (minor seventh) ii∅7: half-diminished seventh III7: major-major seventh (major seventh) iv7: minor-minor seventh (minor seventh) v7: minor-minor seventh (minor seventh) V7: major-minor seventh (dominant seventh) VI7: major-major seventh (major seventh) VII7: major-minor seventh (dominant seventh) vii°7: fully diminished seventh (diminished seventh) Note that the quality of v7/V7 and VII7/viio7 differs depending on whether or not the leading tone is raised. Additionally, major seventh and dominant seventh chords have the same Roman numeral nomenclature; in other words, a I7 chord and a V7 chord are written the same even though the former is a major seventh chord and the latter is a dominant seventh chord. The difference would be discerned from the musical context. Inversion Roman numerals also denote inversions, shown through figured bass symbols placed after the Roman numeral (see the Inversion and Figured Bass chapter). For example, a superscript 6 represents a first inversion triad, and the figures [latex]^4_3[/latex] would indicate a second inversion seventh chord. Example 5 shows four different inverted chords with Roman numerals: Example 5. Four inverted chords with Roman numerals and figures. Roman Numeral Analysis To complete a Roman numeral analysis, begin by identifying the work's key and writing it under the key signature at the beginning of the work, using an uppercase letter name for a major key and a lowercase letter name for a minor key. It can also be helpful to write a lowercase "m" following the letter name of a minor key (e.g., "dm" for D minor). Be sure to apply any applicable accidental (e.g., "E♭" for E-flat major). After you identify and write the key at the start of the work, follow these steps for each chord to complete the Roman numeral analysis: If a chord is in inversion, stack it in root position (preferably mentally). Identify all the notes of the chord, taking its quality into account. Write the Roman numeral that corresponds with the scale degree of the chord's root, reflecting the quality in the Roman numeral (uppercase or lowercase). Write any additional quality symbols ( o, ∅, +) as needed. Write figures after the Roman numeral. Example 6 shows a Roman numeral analysis for Johann Sebastian Bach's chorale "Jesu meiner Seelen Wonne" (1642), which translates to "Jesus, delight of my soul." When analyzing this chorale, ignore the notes in parentheses. It is recommended that you cover up the Roman numerals in this example and try to generate them on your own before uncovering them: Example 6. Roman numeral analysis of an excerpt of Johann Sebastian Bach's "Jesu, meiner Seelen Wonne" (BWV 359). Roman numeral analysis is not just limited to chorales; indeed, you can apply them to many different genres of music. Example 7 shows an excerpt from "Caro Mio Ben" (c. 1783), which translates to "Dearly beloved" and is attributed to Guiseppe Giodani, with a Roman numeral analysis: Example 7. Roman numeral analysis of an excerpt of Giuseppe Giordani's "Caro Mio Ben." When the same chord occurs two or more times in a row, which is common, you can choose whether to repeat the Roman numeral (as in measure 1 of Example 7) or not (as in measure 2 of Example 6). Writing Chords in SATB

that end, at least for composers who joined Schoenberg in viewing it as a “method of composing with twelve tones which are related only with one another” (1950, 107)—contrast that with the fundamentally hierarchical tonal system. It may not be coincidental that it emerged in interwar Europe, when there may well have been a desire to start anew. Equal tones? A new world order? Maybe, but the method has served a wide range of composers with correspondingly diverse aims, so it’s not so straightforward to summarize. There’s also a totalizing angle here that’s rather less utopian. Schoenberg is famously alleged to have described "his" discovery as one "which will ensure the supremacy of German music for the next hundred years" (qtd. in Stuckenschmidt 1977, 277). Schoenberg may or may not have actually said this, but Boulez definitely did later describe every composer to have remained "outside the serial experiments" since their discovery as "useless" ("Schönberg est mort," Score, 1952, reproduced in Notes of an Apprenticeship, 1968, 274). A Series of Precedents? There is a great deal of precedent for general forms of musical thinking pertinent to serial technique, from simple melodic inversion to furiously complex crab canons, and certain works like Bach’s Art of Fugue are notable partly for the strictness and comprehensiveness of design in general, and the healthy dose of "mirror writing" in particular. In these cases, the mirror is usually "horizontal," giving versions of the twelve-tone technique’s I-form. The R-form of retrograde symmetry (given by a "vertical" mirror, if you will) is a primarily 20th-century concern, serial and otherwise. Non-serial 20th-century examples include a great deal of Bartók, the prelude/postlude pair in Hindemith's Ludus Tonalis, and Britten's Cantata Academica mvt. 2 (tellingly titled Alla rovescio). There are earlier examples, such as the Menuet al Roverso from Haydn’s Symphony no. 47 in G, but they are very rare. There are (equally rare and also rather dubious) cases of tonal works that are said to exhibit the specifically twelve-tone practice of rotating through all the pitches. Often-cited examples include the choice of keys in the development of the finale to Mozart’s Symphony no. 40.  Conversely, there are 20th-century composers who wrote music that is serially organized in the sense that we would recognize, but in such a way as to embrace the sound world of an extended tonality (Example 1). Examples of this include: Alban Berg's Violin Concerto, with its row centered on triads and fifths. Hale Smith's Evocation, which the composer notes to have an "affinity" with jazz. Among the "jazzy" and/or "tonal" elements of this piece is the foregrounding of set [0,2,7], which the scholar Horace J. Maxile Jr. links to "the quartal harmonic and improvisational stylings of bop and post-bop schools" (2004, 125). Benjamin Britten’s Turn of the Screw, which adopts a similarly quartal structure in the row from which both the theme and tonal centers for the acts are serially organized. Example 1. Tonal Tone Rows by FourScoreAndMore Speaking of "tonal serialism," the trappings of tonality are not limited to pitch: what composers do with the other parameters is equally important. It's often observed (usually critically) that Schoenberg's early serial works may have used the twelve-tone technique in the pitch domain, but still adopted tonal forms, rhythms, and idioms such as waltzes. The Emergence and Evolution of the Twelve-Tone Technique Schoenberg is intimately associated with the twelve-tone technique and was quite content to describe it as "his" discovery (as above), though many people arrived at the idea largely independently around the same time, notably including Josef Matthias Hauer and Herbert Eimert. Schoenberg famously discussed relevant considerations like the "emancipation of the dissonance" early on, but his thoughts on serialism only emerged later, after those two others. Hauer’s theory as expressed in his Zwölftontechnik: Die Lehre von den Tropen (1926) is notable for its early formalization of the twelve-tone technique and for organizing the millions of possibilities into 44 "tropes" (types) of tone rows in four groups based on symmetries among the unordered hexachords (with the prefixes Poly-, Mono-, Endo-, and Exo-). After the first generation of "classic" serialists, we start to see a wider range of serial practices emerge, including a move toward "integral" or "total" serialism, which applies serial technique to parameters other than pitch, particularly rhythm, dynamics, and articulation. I say "after," but Ruth Crawford Seeger was already writing what later came to be known as integral or total serialism as early as c. 1930. The most frequently cited examples came later, in a burst around 1950: Milton Babbitt: Three Compositions for Piano (1947) Olivier Messiaen: Mode de valeurs et d’intensités for piano (1949–50) Karlheinz Stockhausen: Kreuzspiel for oboe, bass clarinet, piano, and two percussion (1951) Pierre Boulez: Structures 1 for two pianos (1952) There were also signs of this mentality already in those "classic" early works. For instance, in the first movement of Webern’s Symphonie Op.21 (discussed further in this chapter), the exposition sees pitch classes fixed in specific registers, and his Op. 27 Variations for Piano has pitches, durations, and dynamics all aligned (for instance, B and G♯ are always eight notes, legato, and forte). The span of notes a voice or instrument can produce. Duplicating some notes of a chord in multiple parts. Ordering the notes of a chord so that it is entirely stacked in thirds. The root of the chord is on the bottom. The act of mirroring pitch content vertically, so that motion down becomes up and up becomes down. Inversion often preserves intervallic content. The previous chapter dealt with some important but relatively unsubtle color changes. Here, we hone in on some of the finer methods for making detailed changes of this kind, organizing the chapter around the apparent motivations for these changes, seeking to create: a timbral cadence a smooth structural boundary; an "attack-sustain" ("resonance") effect a seamless orchestral crescendo a timbrally nuanced melody Apart from changing the timbral distribution between sections (after a cadence), some composers make changes for the cadence itself, emphasizing the cadential moment. This is related to the more formal considerations of holding back a timbre discussed in the previous chapter. Classical-era orchestral composers sometimes used wind parts in this way. Here’s an example from the opening of Mozart’s Piano Concerto K453, movement 3. The strings begin, and the timbral cadences are marked by the addition of winds (highlighted in the example). Mozart K453 Shostakovich provides some extraordinary 20th-century examples of this device. Consider the end of Shostakovich 11/iii. The outer sections of this movement are effectively one long viola solo, and the timbral addition of unison violins at the end is integral to formalizing the end of the theme. The melodic contour and discontinuation of the countersubject are also contributing, but the harmony is deeply ambiguous. In the following recording, the theme plays from 0’50” and the timbral cadences fall at the ends of the sections (4’50” and 12’40”). This device is not unique to orchestral music. For instance, Blink 182 uses the same effect to close verses in the song "I Miss You": here the timbral cadence is achieved by the addition of the other vocalist (e.g., at 0'55"). To finesse a structural boundary Timbral additions can also be used in the opposite sense: to finesse a structural boundary and actively connect the two sections. This is a favored device of Brahms. Brahms 2/iii opens with a gracious oboe theme, and it is the return of the oboe (in tandem with motivic handling and other matters) that finesses the return to the A section at m. 101/107. Brahms 2 iii It is the oboe again that Brahms adds to round out the first cadence of Brahms 4/i. (Note also the cello-viola dovetailing here.) Brahms 4 i For the "attack-sustain" ("resonance") effect One technique beloved of 20th-century composers is the "attack-sustain" or "resonance" effect. Acoustics teaches us that the very start of a note has a very different profile from the rest, and composers seem to be striving for something similar in orchestral writing that casts some instruments in an "attacking" role (shorter notes at the start) and others as "sustain" (longer notes starting together on the same pitches). Examples abound and are not limited to the 20th century. For instance: Mozart: Magic Flute overture. When the brass parts enter, the horns are long, while the trumpets and trombones are short. Mozart: Dies Irae (from the Requiem): again, trumpets and drums are short; others long. Beethoven: The opening of Symphony 1/i is an iconic example, and not only for the extraordinary harmonies. The winds’ fp chords achieve the attack-sustain pair on their own, and are enhanced by string pizzicato (attack only). In the 20th century, Schoenberg’s groundbreaking "Farben" (no. 3 from Five Orchestral Pieces) includes this effect (e.g., see the harp at reh. 2), and Britten uses it to magnificent effect in movement iii of the Four Sea Interludes. Play the following example from c. 0’45”. Britten uses penetrating instruments for the attacks (including the harp again) and sets the resonance on sustained flute lines, as shown in this small excerpt: "Attack-sustain" detail from Britten's Four Sea Interludes (Note the octave transposition of the harp harmonics.) Later in the movement (around reh. 3), the same device appears with xylophone and piccolo on attack, and trumpet sustaining. This practice is related to the wider device of employing different articulations on doublings of the same melodic line. Clear examples include: Debussy: La Mer / iii (fig. 55). The oboe has repeated notes; the flute does not. Sibelius: En Saga: m. 189, (viola pizz. + arco); m. 290 (trumpet staccato with oboe legato), then oboe with viola. This, in turn, is related to the practice of having string parts play melodies tremolo for loud sections as seen in the Grieg example from the previous chapter. For a seamless orchestral crescendo That Grieg example displayed the kind of step-by-step orchestral crescendo that some composers turned into an extremely subtle process. Consider the following example of two extracts from Wagner’s Parsifal. The melody is in unison, and in both cases, a timbre is added at the top of the crescendo. In both cases, a higher, brighter version of an instrument already in the mix is added. In the second case, this is partly for registral reasons (the oboe replaces the bassoon in a high register); in both cases it transforms the sound, very subtly adding a timbral dimension to mark the moment in question. Wagner - Parsifal extracts Once again, it falls to the 20th century to furnish us with the truly iconic example of this process. Listen to this short crescendo from niente from Berg’s Wozzeck (preferably on good speakers, and having warned the neighbors!). Dramatically, this is the murder scene; musically, it is one huge orchestral crescendo on the pitch B3. See if you can pick out some of the successively entering instruments, and then scroll down for the answer. This reduction sets out the process: Summary of the instrument entrances in the B3 unison of Berg's Wozzeck In a landmark book about sound spectra, Robert Cogan described the beginning of this passage as "almost entirely fundamental": that is, almost a pure sine wave, with strictly minimized upper partials. We begin pppp with the muted French horn: an entirely appropriate choice in that it has the least spectrally active sound available in the standard symphony orchestra and, partly by definition, also the most distant one. Not only do the players sit near the back, but their instrument projects the sound backwards, further increasing the distance and ensuring that the majority of the audience hears primarily wall-reflected sound. Between this and the use of a mute, a great deal of high-register spectral content is removed, leaving that nearly pure fundamental. The mute on the solo violin, which is next to enter, has a similar spectral-auditory effect. When the bass clarinet joins the sound, some higher spectra are introduced, though few, as the instrument is high in its range and produces only odd-numbered partials. What follows continues this crescendo not only of sound, but of instrument types and spectral content. Naturally, the heavy brass are last to enter, burnishing the end to this spectral progression with brilliance. For timbrally nuanced melodies Finally, many composers since around 1900 have used timbral variation to create a kind of "kaleidoscope" melody. This is most commonly known as Klangfarbenmelodie ("sound-color melody"). The term Klangfarbenmelodie was coined by Schoenberg in his Harmonielehre (1911) and employed most notably in his "Farben" (no. 3 from Five Orchestral Pieces). It is also related to musical pointillism, in which one melody passes among many instruments to color a single line. Examples include Webern’s iconic Konzert, Op. 24, in which timbre helps to articulate the structural divisions of the row (about this, see this chapter), but also in a great deal of Mahler. See, for instance, this example from the beginning of Mahler 7/iii, in which a pointillist start begins to coalesce. We’ll end this chapter with an extraordinary example: Webern’s orchestration of Bach’s Ricercata from the Musical Offering. The work is at once a faithful, note-for-note transcription of the original and an analysis-by-orchestration of its motives and melodic contour. It is more of a compositional orchestration than an arrangement or transcription per se. The image below provides a reduction of the exposition. There is a staff for each presentation of the theme (corresponding to the six entrances of the fugal voices). A Musical Offering Webern’s instrumental distribution of the fugal subject theme follows a palindromic, possibly even double palindromic design. Dotted lines beneath each staff demonstrate the first, primary, clear and consistent palindrome; those over the top set out the second, which is not so consistently used, and which may be less effective in accounting for the last two instrumental choices than the square brackets that illuminate how these two instruments often repeat an earlier pairing. The asterisks above the staff indicate notes doubled by the harp, the first of which serves to articulate the first timbral recurrence (initiating the palindrome), while the latter two identify the end of the theme. The diagonal arrows further speculate on the possible relation between the successive instrumental timbres of the first answer and those that begin the next two subject-answer statements. Finally, the last two systems show how Sofia Gubaidulina’s violin concerto Offertorium takes up this double palindromic instrumentation of Bach’s theme. That timbral design is not consistent throughout  (hence only presenting the first two instances of the theme), but instead relates to an overall formal process that truncates one note from the beginning and end of the theme at each successive presentation. This continues up to a central point, after which the process is symmetrically reversed. Clearly these are highly specific modernist examples in which symmetry is paramount, but again, we can see pre-echoes of this kind of idea in pre-20th-century music. For instance, there are symmetrical timbral schemes in: Schubert 8/ii: the melody moves from the clarinet (in minor) to oboe (major) in the exposition; the process is reversed in the recapitulation (oboe-clarinet). Brahms 3/iii: the theme and accompaniment move from strings to winds in the first section and from winds to strings in the reprise. Both cases reflect their larger forms just as Webern and Gubaidulina do. A 7 that is one half step below 1̂. The leading tone is diatonic in major keys, but requires an accidental in minor keys. Altered dominant chords feature either an augmented or diminished fifth. Augmented fifths are indicated in analysis by “+” beside the Roman numeral. Diminished fifths are indicated by a “o” beside the Roman numeral. Dominant with an augmented fifth If you raise the fifth of a dominant triad, it will become an augmented triad. Typically, raised fifths resolve upward by step to the third of its target chord. Note that the augmented triad is a symmetrical chord than can be interpreted in multiple ways, making it difficult to identify its root without proper surrounding context. Like the diminished-seventh chord, this means that the augmented triad can be a pathway to distant, chromatic modulations. See Example 1, which shows the three possible enharmonic interpretations and resolutions of the C augmented triad. Importantly, these chords do not resolve easily to minor triads, since the augmented fifth would not be able to resolve upward by step. Example 1: The three possible resolutions of the C augmented triad. The Dominant with Diminished Fifth When you add a 7th to a Vo chord, you get a chord that sounds precisely like a French augmented-sixth chord. This equivalence becomes even clearer when you use the Vo7 chord in second inversion, leaving the lowered fifth in the bass voice to resolve downward by step. As Example 2 shows, the chords Vo4/3/V and the French augmented-sixth chord are identical. Example 2: The dominant chord with a diminished fifth, and its equivalence with the French augmented-sixth chord. Extended dominant chords Extensions can be added to dominant chords to create new and interesting sonorities. These chords are typically found only in root position. When composing these chords in a four-voice texture, you need to decide which notes to leave out. These chords will always include the root and the chordal seventh. The V9 chord replaces a doubled root with a ninth. The ninth should resolve down by step. The V11 chord replaces the third with an eleventh. The eleventh “resolves” by common-tone. This chord typically includes both the ninth and the eleventh, and resembles a IV chord with scale-degree 5 in the bass. The V13 chord replaces the fifth with a thirteenth. The thirteenth “resolves” by leaping down by third to scale-degree 1.