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Maths formula / integration formulas Home » Maths formula » [PDF] Integration Formulas for Class 12 Integration is the inverse process of differentiation. In differentiation, we are given a function and asked to determine its differential coefficient or derivative. In integration, we are given the derivative of a function and asked to find that function. Here, fundamental integration formulas for various functions are mentioned. In addition to the fundamental integration formulas, this article also provides a classification of integral formulas. Integration formulas for class 12 Important extension formulae of standard Integral forms Integrals of some special functions (i) (ii) (iii) (iv) (v) (vi) (vii) (viii) (ix) (x) (xi) (xii) (xiii) (xiv) (xv) (xvi) Walli's Formula of Integration If m and n be integers, then (i) (ii) Class 12 integration formulas PDF File Name: list-of-basic-integrals.pdf File Name: extension-formulae-of-standard-integral-forms.pdf You might also be interested in: □□□□ YouTube Channel Subscribe □□□□ ! List of all Integration Formulas: Integral is considered the calculation of an integral. Integrals are generally employed in arithmetic calculations to solve a number of quantities like volume, area, displacement, etc. The integrals can be definite or indefinite. Integration is one of two major calculus branches of Mathematics apart from Differentiation. Integration involves determining how a function changes with its variables. While it's part of the 11th and 12th-grade syllabus, it holds special importance when getting ready for the IIT-JEE exams. In this article, we provide the basics of Integration and the list of all Integration Formulas. Integration Formulas The integration Formula can be called the reverse step of differentiation formula. Sometimes it is called Inverse Differentiation. In calculus study, Integration is defined as the process of calculating a function with its derivative. The basic integration formulas for the different functions are explained here. Additionally, some sample questions are also mentioned here in this article. In this study, the integration by parts means integrating the product of two functions such as y = uv. Basic Integration Formulas The basic formulas in integration for the different functions are tabulated here. These given Integral formulas are important for solving the problems of integral calculus. Basic Integration Formulas S.no Formula 1. ∫ 1 dx = x + C 2. ∫ a dx = ax+ C 3 ∫ xn dx = ((xn+1)/(n+1)) + C ; n ≠1 4. ∫ sin x dx = – cos x + C 5. ∫ cos x dx = sin x + C 6. ∫ sec²x dx = tan x + C 7. ∫ cosec²x dx = – cot x + C 8. ∫ sec x (tan x) dx = sec x + C 9. ∫ cosec x (cot x) dx = – cosec x + C 10. ∫ (1/x) dx = ln |x| + C 11. ∫ ex dx = ex+ C 12. ∫ ax dx = (ax / ln a) + C ; a>0, a≠1 13. ∫ tanx.dx =log|secx| + C 14. ∫ cotx.dx = log|sinx| + C 15. ∫ secx.dx = log|secx + tanx| + C 16. ∫ cosecx.dx = log|cosecx – cotx| + C Integration Formulas of Inverse Trigonometric Functions The integral formulas related to the Inverse Trigonometric Functions with Limits are given below. Integration Formula of Inverse Trigonometric Functions S.no Formula 1. ∫ 1/(1 +x²).dx = -cot-1x + C 2. ∫ 1/x√(x² – 1).dx = sec-1x + C 3. ∫ 1/x√(x² – 1).dx = -cosec-1 x + C 4. ∫1/√(1 – x²).dx = sin-1x + C 5. ∫ /1(1 – x²).dx = -cos-1x + C 6. ∫1/(1 + x²).dx = tan-1x + C Difficult Integration Formulas The Difficult Integral Formulas related to the Trigonometric Functions and Logarithms are given below. Difficult Integration Formula S.no Formula 1. ∫ √(x² + a²).dx =1/2.x.√(x² + a²)+ a²/2 . log|x + √(x² + a²)| + C 2. ∫1/(x² + a²).dx = 1/a.tan-1 x/a + C 3. ∫1/√(x² – a²)dx = log|x +√(x² – a²)| + C 4. ∫ √(x² – a²).dx =1/2.x.√(x² – a²)-a²/2 log|x + √(x² – a²)| + C 5. ∫1/√(x² – a²).dx = sin-1 x/a + C 6. ∫1/(x² – a²).dx = 1/2a.log|(x – a)(x + a| + C 7. ∫ 1/(a² – x²).dx =1/2a.log|(a + x)(a – x)| + C 8. ∫1/√(x² + a²).dx = log|x + √(x² + a²)| + C 9. ∫√(a² – x²).dx = 1/2.x.√(a² – x²).dx + a²/2.sin-1 x/a + C Application of Integration Formulas The Integrals can be either Definite Integrals or Indefinite Integrals. The application of Integration depends on the types of integrals used in calculus. Definite Integral Formulas These are integration calculations with the pre-existing values of their limits. These result in a determined end value of the Integral. b∫ag (x). dx = G(b) – G(a) Indefinite Integral Formulas These are integration calculations without the pre-existing values of their limits. These result in the indefinite final value of the integral. The Integration Constant 'C' is applied in this case. g'(x) = g(x) + C Integration Formulas: Questions with Solutions Question: Find the value of ∫ 16 x³ dx. Solution: ∫ 16 x³ dx = 16 ∫ x³ dx = 16 x^4 / 4 + C = 4 x^4 + C Question: Determine the value of ∫ Cos x + x dx. Solution: ∫Cosx + xdx = ∫Cosxdx + ∫xdx ∫Cosx + xdx = sinx + x² / 2 + C Question: What is the value of ∫2x cos (x² – 5) ? Solution: I = ∫2x cos (x² – 5). dx Let x2–5 = t …..(1st) 2x. dx = dt After putting above values, we get I = ∫ cos (t). dt I = sin t + C …..(2nd) After putting the values of 1st equation in 2nd then we get ∫2x cos (x² – 5) = sin(x² – 5) + C Integrals CBSE Maths Class 12 Chapter 7 Formulas and PropertiesMaths Integrals Formulas: The CBSE Class 12 mathematics course is heavily focused on calculus, and Chapter 7 Integrals is one of the lengthiest and most important chapters on the topic. Integrals is the first chapter in book 2 and covers the branch of calculus that deals with finding out the numerical values of the area under the graph of a function for some interval.Integration is the opposite of derivation and one of the two fundamental operations in calculus, making Integrals essential from an exam perspective and application in higher studies as well. Integrals consist of numerous formulas, theorems, identities and rules that students need to learn.Learning formulas helps simplify complex equations and solve problems quickly. On that note, be sure to take a look at the CBSE Class 12 Maths Chapter 7 Integrals Formulas below.Recommended:CBSE Class 12 Maths Mind Map for Chapter 7 IntegralsCBSE Class 12 Maths Chapter 7 Integrals MCQsCBSE Class 12 Maths Chapter 7 Integrals Formulas and TheoremsWe have listed all the important formulas, definitions and properties of CBSE Class 12 Integrals here.IntegrationIn differential calculus, we are given a function and we have to find the derivative or differential of this function, but in integral calculus, we are to find a function whose differential is given. Thus, integration is a process which is the inverse of differentiation.Definite IntegralsA definite integral is the area under a curve between two fixed limits.Properties of Definite IntegralsIndefinite IntegralsAn integral which is not having any upper and lower limit.First fundamental theorem of integral calculusLet the area function be defined by A(x) = a∫x f(x)dx for all x ≥ a, where the function f is assumed to be continuous on [a, b]. Then A′(x) = f (x) for all x ∈ [a, b].Second fundamental theorem of integral calculusLet f be a continuous function of x defined on the closed interval [a, b] and let F be another function such that d/dx F(x) = f(x) for all x in the domain of f, thenThis is called the definite integral of f over the range [a, b], where a and b are called the limits of integration, a being the lower limit and b the upper limit.Standard IntegralsIntegration By SubstitutionA change in the variable of integration often reduces an integral to one of the fundamental integrals. The method in which we change the variable to some other variable is called the method of substitution. When the integrand involves some trigonometric functions, we use some well-known identities to find the integrals. Using the substitution technique, we obtain the following standard integrals. Algebraic expressions, trigonometric ratios, inverse trigonometric functions, logarithmic and exponential functions can all be integrated using integration formulas. The basic functions for which the derivatives were produced are obtained by integrating functions. Integration can be seen as the inverse of differentiation or known as Inverse Differentiation. Integration Formulas These integration formulas are used to obtain a function and it's derivative. We acquire a family of functions in I when we differentiate a function f in an interval I. We can determine the function f if we know the values of functions in I. Integration is the opposing process of differentiation. Let's take it a step further and look at the integration formulas that are employed in integration procedures. Integration involves determining a function that has a given derivative. Here are various basic integration formulas for different functions. In addition to the fundamental integration formulas, this section also provides a breakdown of integral formulas and some example questions for practicing with the integration formulas discussed in this article. Integration Formula The following sets of formulas are a general presentation of the integration formulas. Basic integration formula are, integration of trigonometric ratios, inverse trigonometric functions, the product of functions, and a more complex set of integration formulas are all included. Integration is essentially a method of joining the parts to create the whole. It is differentiation's opposite action. The fundamental integration equation is thus f'(x) dx = f(x) + C. Integration Formulas Class 12 The calculation of an integral is known as integration. Integrals are used in arithmetic to calculate a variety of useful quantities such as areas, volumes, displacement, and so on. When we talk about integrals, we usually mean definite integrals. For art derivatives, indefinite integrals are utilized. Apart from differentiation, integration is one of the two major calculus subjects in mathematics that measures the rate of change of any function with regard to its variables. It's a broad topic that's covered in upper-level classes like Class 11 and 12. All Integration Formulas PDF Integration Formulas PDFs are given below and Check all integration formula sheets. ?This browser does not support PDF!□ All Integration Formula Pdf is very useful for all Board Students and other competition exams candidates. Download this pdf to score well in board exams. Click Here to Download INTEGRATION FORMULAE PDF Integration Formulas for Class 12 and 11 Students The most common integration formulas include: Constant rule: ∫c dx = cx + C, where c is a constant. Power rule: ∫x^n dx = (x^(n+1))/(n+1) + C, where n ≠ -1. Sum and difference rules: ∫(f(x) ± g(x)) dx = ∫f(x) dx ± ∫g(x) dx. Constant multiple rule: ∫c * f(x) dx = c * ∫f(x) dx. Trigonometric functions: ∫sin(x) dx = -cos(x) + C, ∫cos(x) dx = sin(x) + C, ∫sec^2(x) dx = tan(x) + C, ∫sec(x)tan(x) dx = sec(x) + C. Inverse trigonometric functions: ∫csc^2(x) dx = -csc(x)cot(x) + C, ∫sec(x)cot(x) dx = ln|sec(x) + tan(x)| + C. Logarithmic functions: ∫(1/x) dx = ln|x| + C, ∫ln(x) dx = xln(x) – x + C. Exponential functions: ∫e^x dx = e^x + C. Integration by substitution: ∫f(g(x))g'(x) dx = ∫f(u) du, where u = g(x). Integration by parts: ∫u dv = uv – ∫v du, where u and v are functions of x. Trigonometric substitution: ∫(a^2 – x^2)^(1/2) dx = a ∫sec^2(θ) dθ, where x = a sin(θ) or x = a tan(θ) partial fraction decomposition: ∫(f(x)/(ax+b)) dx = ln|ax+b| + C Note: C is the constant of integration. All Integration Formulas Sheet List wise The basic integral formulas are given below: ∫ 1 dx = x + C ∫ a dx = ax+ C ∫ xn dx = ((xn+1)/(n+1))+C ; n≠1 ∫ sin x dx = – cos x + C ∫ cos x dx = sin x + C ∫ sec2x dx = tan x + C ∫ cosec2x dx = -cot x + C ∫ sec x (tan x) dx = sec x + C ∫ cosec x (cot x) dx = – cosec x + C ∫ (1/x) dx = ln |x| + C ∫ ex dx = ex+ C ∫ ax dx = (ax/ln a) + C ; a>0, a≠1 ∫ tanx.dx =log|secx| + C ∫ cotx.dx = log|sinx| + C ∫ secx.dx = log|secx + tanx| + C ∫ cosecx.dx = log|cosecx – cotx| + C Integration Formulas of Inverse Trigonometric Functions with limits ∫ 1/(1 +x2).dx = -cot-1x + C ∫ 1/x√(x2 – 1).dx = sec-1x + C ∫ 1/x√(x2 – 1).dx = -cosec-1 x + C ∫1/√(1 – x2).dx = sin-1x + C ∫ /1(1 – x2).dx = -cos-1x + C ∫1/(1 + x2).dx = tan-1x + C List of Difficult Integration Formulas ∫ √(x2 + a2).dx =1/2.x.√(x2 + a2)+ a2/2 . log|x + √(x2 + a2)| + C ∫1/(x2 + a2).dx = 1/a.tan-1x/a + C ∫1/√(x2 – a2)dx = log|x +√(x2 – a2)| + C ∫ √(x2 – a2).dx =1/2.x.√(x2 – a2)-a2/2 log|x + √(x2 – a2)| + C ∫1/√(a2 – x2).dx = sin-1 x/a + C ∫1/(x2 – a2).dx = 1/2a.log|(x – a)(x + a| + C ∫ 1/(a2 – x2).dx =1/2a.log|(a + x)(a – x)| + C ∫1/√(x2 + a2).dx = log|x + √(x2 + a2)| + C ∫√(a2 – x2).dx = 1/2.x.√(a2 – x2).dx + a2/2.sin-1 x/a + C Integration Formula Top 10 useful formulas Here is a list of commonly used integration formulas: Power Rule: ∫x^n dx = (1/(n+1)) * x^(n+1), where n ≠ -1 Constant Rule: ∫k dx = kx + C, where k is a constant Exponential Function: ∫e^x dx = e^x + C Natural Logarithm: ∫(1/x) dx = ln|x| + C Trigonometric Functions: ∫sin(x) dx = -cos(x) + C ∫cos(x) dx = sin(x) + C ∫sec^2(x) dx = tan(x) + C ∫csc^2(x) dx = -cot(x) + C ∫sec(x) * tan(x) dx = sec(x) + C ∫csc(x) * cot(x) dx = -csc(x) + C Inverse Trigonometric Functions: ∫(1/√(1-x^2)) dx = arcsin(x) + C ∫(1/(1+x^2)) dx = arctan(x) + C Logarithmic Functions: ∫(1/(xln(a))) dx = ln|ln(a)| + C, where a > 0 and a ≠ 1 ∫(1/x) ln(x) dx = (1/2)ln^2(x) + C Hyperbolic Functions: ∫sinh(x) dx = cosh(x) + C ∫cosh(x) dx = sinh(x) + C ∫sech^2(x) dx = tanh(x) + C Rational Functions: ∫(1/(x^2 + a^2)) dx = (1/a)arctan(x/a) + C, where a ≠ 0 ∫(1/(x^2 – a^2)) dx = (1/(2a))ln|(x-a)/(x+a)| + C, where a ≠ 0 Integration by Parts: ∫u dv = uv – ∫v du, where u and v are differentiable functions Integration Formulas for Engineering Integration is one of the most important concepts that find a wide range of applications in engineering domain. So, any student who desire to become an Engineer must develop a solid foundation in this topic. Some of the integration formulas necessary for engineering aspirants are given below. ∫sin(x) dx = -cos(x) + C ∫cos(x) dx = sin(x) + C ∫sec²(x) dx = tan(x) + C ∫csc²(x) dx = -cot(x) + C ∫sec(x) * tan(x) dx = sec(x) + C ∫csc(x) * cot(x) dx = -csc(x) + C ∫1/√(1 – x2).dx = sin-1x + C ∫ -1/x√(x2 – 1).dx = cosec-1x + C ∫ -1/√(1 – x2).dx = cos-1x + C ∫ 1/x√(x2 – 1).dx = sec-1x + C ∫1/(1 + x2).dx = tan-1x + C ∫-1/(1 + x2).dx = cot-1x + C Integration Formula UV The integration formula UV is a special type of integration rule known as integration by parts. The Integration formula for UV is also commonly known by the name product rule of integration. Here, we combine the results of two functions. If we are given with two functions: u(x) and v(x), and they are of the type ∫u dv, then the Integration of uv formula is expressed as: ∫ uv dx = u ∫ v dx – ∫ (u' ∫ v dx) dx , u is the first function and v is the second function ∫ u dv = uv – ∫ v du , here u is the first function and dv is the second function To find out the first function, i.e., u, we use the ILATE or LIATE rule, where L – Logarithmic function I – Inverse trigonometric function A – Algebraic function T – Trigonometric function E – Exponential function The functions are assigned the higher priority of u from up to down. It can be though of as an analogous rule of BODMAS. For example, if we have been given a logarithmic function and a trigonometric function, then u will be logarithmic function and v will be trigonometric function. Integration Formulas- Application There are two sorts of integrals in general. They are integrals that are either definite or indefinite.. Definite Integration Formula These are integrations with a pre-existing value of limits, resulting in a determined end value of integral. b∫ag(x)dx = G(b) – G(a) Indefinite Integration Formula These are integrations that do not have a pre-existing limit value, rendering the integral's final value indefinite. The integration constant C is used here. g'(x) = g(x) + C We use the integration formulas discussed so far in approximating the area bounded by curves, evaluating average distance, velocity, and acceleration oriented problems, finding the average value of a function, approximating the volume and surface area of solids, estimating the arc length, and finding the kinetic energy of a moving object using improper integrals. Integration Integration is a fundamental concept in calculus that involves finding the integral of a function. The integral of a function represents the area under the curve of the function over a certain interval. It also has applications in calculating quantities such as displacement, area, volume, and more. There are two main types of integrals: definite integrals and indefinite integrals. Indefinite Integral: The indefinite integral of a function f(x) is denoted as ∫f(x)dx, and it represents the family of functions whose derivative is f(x). The result includes an arbitrary constant C:∫f(x)dx=F(x)+Cwhere F(x) is an antiderivative of f(x). Definite Integral: The definite integral of a function over an interval [a,b] is denoted as ∫abf(x)dx. It represents the signed area between the curve of f(x) and the x-axis over the interval [a,b]:∫abf(x)dx=F(b)−F(a)where f(x) is an antiderivative of f(x). Integration involves various techniques, including substitution, integration by parts, trigonometric integrals, and partial fractions. Some common integrals include: ∫xndx=n+1xn+1+C (for n=−1) ∫exdx=ex+C ∫sin(x)dx=−cos(x)+C ∫cos(x)dx=sin(x)+C ∫x1dx=ln|x|+C (for x=0) Keep in mind that integration is a vast topic with many nuances and applications, including definite and indefinite integrals of both elementary and more complex functions. It's important to understand the fundamental concepts and practice various techniques to become proficient in integration. Integration Formulas Examples Example 1: Find the value of ∫ (9x+ 25)/ (x+3)2 .dx Solution: (9x+ 25)/ (x+3)2 is a rational function. Using the partial fraction decomposition, we have (9x+ 25)/(x+3)2 = A/(x+3) + B/(x+3)2 Taking LCD, we get (9x+ 25)/(x+3)2 = [A(x+3) +B]/(x+3)2 Equating the numerator, we get 9x+ 25 = A(x+3) +B Solving for B when x = -3, we get B = -2 Solving for A when x = 0, we get A = 9 Thus the partial fraction is decomposed as 9/(x+3) -2/(x+3)2 As stated in the integration formulas above, find the integral of 9/(x+3) -2/(x+3)2 . ∫[9/(x+3)]dx – ∫ -2(x+3)2 .dx = 9 ln(x+3) – 2 /(x+3) +C Example 2:∫x3+3x+4x√dx Solution: Example 3:∫x3−x2+x−1x−1dx Solution: Related Post: Here is the Integration Formulas List. The formula list is divided into below sections a. Basic integration formulas b.Integration formulas for Trigonometric Functions c. Integration formulas Related to Inverse Trigonometric Functions d. Algebra of integration e. Integration by Substitution f. Special Integrals Formula g. Integration by Parts h. Some special Integration Formulas derived using Partial Fractions j. Definite Integrals k. Properties of Definite Integrals l. Integration as Limit of Sum $\int (c) = x + C$ (Where c is a constant) $\int (cx) = \frac {cx^{2}{2} + C$ (Where c is a constant) $\int (x^n) = \frac {x^{n+1}}{n+1}$ $\int (e^x) = e^x + C$ $\int (\frac {1}{x}) = ln |x| + c$ $\int (a^x) = \frac {a^x}{ log a} + C$ $\int (log_{a} x) =\frac {1}{x ln a} + C$ $\int (\cos x) = \sin x + C$ $\int (\sin x) = – \cos x + C$ $\int (\sec^2 x) = \tan x + C$ $\int (\csc^2 x) = -\cot x + C$ $\int (\sec (x) \tan (x))=\sec x + C$ $\int (\csc (x) \cot (x)) = -\csc x + C$ $ \int (\tan x) = ln |\sec x| + C$ $ \int (\cot x) = ln |\sin x| + C$ $ \int (\sec x) = ln |\sec x + \tan x| + C$ $ \int (\csc x) = ln |\csc x - \cot x| + C$ $\int (\frac {1}{\sqrt {1-x^2} }) = \sin^{-1}x + C$ $\int (\frac {1}{\sqrt {1-x^2}}) = – \cos ^{-1}x +C$ $\int (\frac {1}{1 + x^2}) =\tan ^{-1}x + C$ $\int (\frac {1}{1 + x^2}) = -\cot ^{-1}x + C$ $\int (\frac {1}{{|x|\sqrt {x^-1}}) = -sec^{-1} x + C $ $\int (\frac {1}{{|x|\sqrt {x^-1}}) = -cosec^{-1} x + C $ Multiplication by Constant $\int [cf(x)] dx = c \int f(x) dx $ Example $\int [2x] dx = 2 \int (x) dx =x^2 + C$ Addition and Subtraction $\int [f(x)+g(x)] dx=\int f(x) dx+ \int g(x) dx$ $\int [f(x)-g(x)]dx=\int f(x) dx – \int g(x) dx$ Example $\int [sinx -cos x] dx = \int sin x dx- \int cos x dx=-cos (x) – sin(x) + C$ A. $\int f(x) dx = g(x) $ then $\int f(ax+ b) = \frac {1}{a} g(x) $ $\int (ax+b)^n = \frac {1}{a} \frac {(ax+ b)^{n+1}}{n+1} + C$ $\int e^{ax+b} =\frac {1}{a} e^{ax+b} + C$ $\int (\frac {1}{ax+b}) = \frac {1}{a} ln |ax +b| + c$ $\int a^{bx+c} = \frac {1}{b} \frac {a^{bx+c}}{ log a} + C$ $\int \cos (ax+b) = \frac {1}{a} sin (ax+b) + C$ $\int \sec^2 (ax+b) = \frac {1}{a} \tan (ax+b) + C$ $\int \csc^2 (ax+b) = – \frac {1}{a} \cot (ax+b)+ C$ $ \int \tan (ax+b) =- \frac {1}{a} ln |\cos (ax+b)| + C$ $ \int \cot (ax+b) = \frac {1}{a} ln |\sin (ax+b)| + C$ $ \int \sec (ax+b) =\frac {1}{a} ln |\sec (ax+b) + \tan (ax+b)| + C$ $ \int \csc (ax+b) = \frac {1}{a} ln |\csc (ax+b) - \cot (ax+b)| + C$ B. $\int \frac {f^{'} (x)}{f(x)} dx = ln | f(x)| + C$ Example $\int \frac {1}{1 + e^{-x}} dx = \int \frac {1}{1 + 1/e^x} dx = \int \frac {e^x}{1+ e^x} dx$ Now this above form $= ln |1 + e^x| + C$. $\int [f(x)]^n f^{'} x dx = \frac { [f(x)]^{n+1}}{n +1 } , n e -1 $ $\int \frac {1}{x^2 + a^2} dx = \frac {1}{a} \tan ^{-1} (\frac {x}{a}) + C$ $\int \frac {1}{x^2 – a^2} dx = \frac {1}{2a} ln |\frac {x-a}{x+a}| + C$ $\int \frac {1}{a^2 – x^2} dx = \frac {1}{2a} ln |\frac {a+x}{a-x}| + C$ $\int \frac {1}{\sqrt {a^2 – x^2}} dx = \sin ^{-1} (\frac {x}{a}) + C$ $\int \frac {1}{\sqrt {a^2 + x^2}} dx = ln |x + \sqrt {a^2 + x^2}| + C$ $\int \frac {1}{\sqrt {x^2 - a^2}} dx = ln |x + \sqrt {x^2 – a^2}| + C$ A. $\int f(x) g(x) dx= f(x) (\int g(x) dx) – \int \left \{ \frac {df(x)}{dx} \int g(x) dx \right \}dx$ We can decide first function using the word ILATE I -> Inverse trigonometric functions L -> Logarithmic functions A-> Algebraic functions T -> trigonometric functions E -> Exponential functions B. $\int e^x{ f(x) + f^{'} (x) } dx = e^x f(x) + C$ $ \int \sqrt {a^2 – x^2} dx = \frac {1}{2} x \sqrt {a^2 – x^2} + \frac {1}{2} a^2 \sin^{-1} \frac {x}{a} + C$ $ \int \sqrt {a^2 + x^2} dx = \frac {1}{2} x \sqrt {a^2 + x^2} + \frac {1}{2} a^2 ln |x +\sqrt {a^2 + x^2}| + C$ $ \int \sqrt {x^2 -a ^2} dx = \frac {1}{2} x \sqrt {x^2 – a^2} – \frac {1}{2} a^2 ln |x +\sqrt {x^2 – a^2}| + C$ The above formula can be to use to integrate the below type of function $ \int \sqrt {ax^2 + bx + c} dx$ We can convert $ax^2 + bx + c$ into above using square method $ \int (px +q) \sqrt {ax^2 + bx + c} dx$ We can express $px + q = \lambda \frac {d}{dx} (ax^2 + bx +c) + \mu$ We find the values of $ \lambda$ and μ Now this will get converted into entities. One of the integration can be obtained from above formula and one from $\int [f(x)]^n f^{'} x dx = \frac { [f(x)]^{n+1}}{n +1 } , n e -1 $ $ \int \frac {px +q}{(x-a)(x-b)} dx =\int \left \{ \frac {A}{x-a} + \frac {B}{x-b} \right \} dx$ $ \int \frac {px^2 +qx + r}{(x-a)(x-b)(x-c)} dx =\int \left \{ \frac {A}{x-a} + \frac {B}{x-b} + \frac {C}{x-c} \right \} dx$ $ \int \frac {px +q}{(x-a)^2} dx =\int \left \{ \frac {A}{x-a} + \frac {B}{(x-a)^2} \right \} dx$ $ \int \frac {px^2 +qx + r}{(x-a)^2(x-c)} dx =\int \left \{ \frac {A}{x-a} + \frac {B}{(x-a)^2} + \frac {C}{x-c} \right \} dx$ $ \int \frac {px^2 +q+r}{(x-a)(x^2 + bx +c)} dx =\int \left \{ \frac {A}{x-a} + \frac {Bx +C}{x^2 + bx +c} \right \} dx$ where $x^2 + bx +c$ is a irreducible quadratic if $\int f(x) dx= g(x)$$\int_{a}^{b} f(x) dx =g(b) -g(a)$ $\int_{a}^{b} f(x) dx= \int_{a}^{b} f(t) dt $ $\int_{a}^{b} f(x) dx=- \int_{b}^{a} f(x) dx $ $\int_{a}^{b} f(x) dx= \int_{a}^{c} f(x) dx + \int_{c}^{b} f(x) dx $ where a