CUEMATH

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Integral of xlnx

The **integral of xlnx** is equal to $(x^2/2)$ lnx - $x^2/4$ + C, where C is the integration constant. We can evaluate this integral using the method of integrati

Further in this article, we will find the integral of xlnx and derive its formula. We will also find the integral of functions involving xlnx and solve a few e

What is the Integral of xlnx?

The integral of xlnx is equal to $(x^2/2)$ lnx - $x^2/4$ + C, where C is the constant of integration. We can calculate the integration of xlnx using integration

Integral of xlnx Formula

The formula for the integral of xlnx is given by, ∫xlnx dx = $(x^2/2)$ lnx - $x^2/4$ + C with C as the constant of integration. This formula can be derived usin

Integral of xlnx Proof

Now that we know that the integral of xlnx is equal to x^2 lnx/2 - $x^2/4$ + C, we will prove it using the method of integration by parts formula. For the int

$\int x\ln x\, dx = \ln(x) \int x\, dx - \int[(\ln x)' \int x\, dx]\, dx$

$= \ln x \times x^2/2 - \int[(1/x) \times x^2/2]\, dx$

$= (x^2/2) \ln x - (1/2) \int x\, dx$

$= (x^2/2) \ln x - (1/2)(x^2/2) + C$

$= (x^2/2) \ln x - x^2/4 + C$

Hence, we have derived the formula for the integral of xlnx using the method of integration by parts.

Integral of x ln x by $\sqrt{(x^2 - 1)}$

To find the integral of x ln x by $\sqrt{(x^2 - 1)}$, we will use the formula of the integration by parts as above. The formula for the integration by parts is given

$\int[x/\sqrt{(x^2 - 1)}]\, dx = \int(u/u)\, du$

$= \int du$

$= u + K$

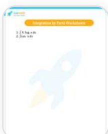
$= \sqrt{(x^2 - 1)} + K$ --- (1)

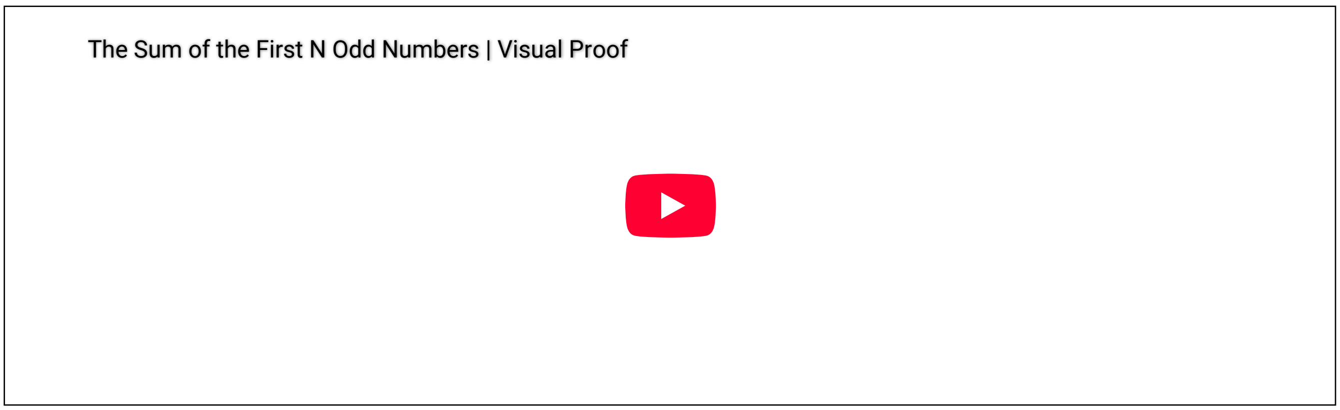
Next, we will calculate the integral of $\sqrt{(x^2 - 1)}/x$. To find this, assume $v = \sqrt{(x^2 - 1)}$, then $dv/dx = x/\sqrt{(x^2 - 1)}$ which implies $dx = \sqrt{(x^2 - 1)}\, dv/x = v/\sqrt{(v^2 +$

$\int[\sqrt{(x^2 - 1)}/x]\, dx = \int [v/\sqrt{(v^2 + 1)}]\, [v/\sqrt{(v^2 + 1)}\, dv]$

$= \int[v^2/(v^2 + 1)]\, dv$

$= \int[(v^2 + 1 - 1)/(v^2 + 1)]\, dv$





Integral of xlnx Examples

Example 1: Find the definite integral of xlnx from 0 to 1.

Solution: We know that the formula for the integral of xlnx is equal to $(x^2/2)$ lnx - $x^2/4$ + C. We will put the limits 0 to 1 in the formula to find its de

$$\int_0^1 x \ln x \, dx = \left[\frac{x^2}{2}\ln x - \frac{x^2}{4} + C\right]_0^1$$

$$= \left(\frac{1^2}{2}\ln 1 - \frac{1^2}{4} + C\right) - \left(\frac{0^2}{2}\ln 0 - \frac{0^2}{4} + C\right)$$

$$= \left(0 - \frac{1}{4} + C\right) - (0 - 0 + C)$$

$$= -\frac{1}{4}$$

Answer: The definite integral of xlnx from 0 to 1 is equal to -1/4.

Integral of xlnx Questions