$$\int_a^b f(x)\ dx \text{ is a } \textit{number}$$

$$\int f(x)\ dx \text{ is a } \textit{function}$$

$\int cf(x)\ dx = c\int f(x)\ dx$ $\quad$ $\int [f(x)+g(x)]\ dx = \int f(x)\ dx + \int g(x)\ dx$

$\int k\ dx = kx + C$

$\int x^n dx = \frac{x^{n+1}}{n+1} + C(n \neq -1)$ $\quad$ $\int \frac{1}{x}\ dx = \ln|x| + C$

$\int e^x dx = e^x + C$ $\quad$ $\int b^x dx = \frac{b^x}{\ln b} + C$

$\int \sin x\ dx = -\cos x + C$ $\quad$ $\int \cos x\ dx = \sin x + C$

$\int \sec^2 x\ dx = \tan x + C$ $\quad$ $\int \csc^2 x\ dx = -\cot x + C$

$\int \sec x \tan x\ dx = \sec x + C$ $\quad$ $\int \csc x \cot x\ dx = -\csc x + C$

$\int \frac{1}{x^2+1} dx = \tan^{-1} x + C$ $\quad$ $\int \frac{1}{\sqrt{1-x^2}} dx = \sin^{-1} x + C$

$\int \sinh x\ dx = \cosh x + C$ $\quad$ $\int \cosh x\ dx = \sinh x + C$

$$\int (10x^4 - 2\sec^2 x)\, dx$$

$$10\left(\frac{x^5}{5}\right) - 2(\tan x) + C$$

$$\boxed{2x^5 - 2\tan x + C}$$

e $\displaystyle\int \frac{\cos\theta}{\sin^2\theta}\,d\theta$

$$\frac{\cos}{\sin}\cdot\frac{1}{\sin}$$

$$\int \cot\theta \csc\theta \, d\theta$$

$$= \boxed{-\csc\theta + C}$$

$\int \sin x \ dx = -\cos x + C$	$\int \cos x \ dx = \sin x + C$
$\int \sec^2 x \ dx = \tan x + C$	$\int \csc^2 x \ dx = -\cot x + C$
$\int \sec x \tan x \ dx = \sec x + C$	$\int \csc x \cot x \ dx = -\csc x + C$
$\int \frac{1}{x^2+1} dx = \tan^{-1} x + C$	$\int \frac{1}{\sqrt{1-x^2}} dx = \sin^{-1} x + C$
$\int \sinh x \ dx = \cosh x + C$	$\int \cosh x \ dx = \sinh x + C$

e $\int_0^3 (x^3 - 6x)\ dx$

$$\left.\frac{x^4}{4} - \frac{6x^2}{2}\right]_0^3 = \left[\frac{3^4}{4} - 3(3)^2\right] - \left[\frac{0^4}{4} - 3(0)^2\right]$$

$$\frac{81}{4} - 27 = -\frac{27}{4}$$

$$\int_1^9 \frac{2t^2 + t^2\sqrt{t} - 1}{t^2}\,dt$$

$$\int_1^9 \frac{2t^2}{t^2} + \frac{t^2\sqrt{t}}{t^2} - \frac{1}{t^2}$$

$$\int_1^9 2 + t^{1/2} - t^{-2} = 2t + \frac{t^{3/2}}{3/2} - \frac{t^{-1}}{-1}$$

$$\int_1$$

$$\int_1^9 2 + t^{1/2} - t^{-2} = 2t + \frac{t^{3/2}}{3/2} - \frac{t^{-1}}{-1}$$

$$\left[2t + \frac{2t^{3/2}}{3} + \frac{1}{t} \right]_1^9$$

$$\left[2(9) + \frac{2(9)^{3/2}}{3} + \frac{1}{9} \right] - \left[2(1) + \frac{2(1)^{3/2}}{3} + \frac{1}{1} \right]$$

$$\left(18 + 18 + 1/9 \right) - \left(2 + 2/3 + 1 \right)$$

$$\left[2(9)+\frac{2(9)^{3/2}}{3}+\frac{1}{9}\right]-\left[2(1)+\frac{2(1)^{3/2}}{3}+\frac{1}{1}\right]$$

$$\left(18+18+{}^{1}/_{9}\right)-\left(2+{}^{2}/_{3}+1\right)$$

$$36+{}^{1}/_{9}-3-{}^{2}/_{3}$$

$$33-{}^{5}/_{9}$$

$$\frac{297}{9}-\frac{5}{9}=\boxed{\frac{292}{9}}$$

A particle moves along a line so that its velocity at time t is $v(t) = t^2 - t - 6$ (measured in meters per second).

Find the displacement of the particle during the time period $1 \leqslant t \leqslant 4$

$$\int_1^4 t^2 - t - 6 = \left.\frac{t^3}{3} - \frac{t^2}{2} - 6t\right]_1^4$$

$$\left[\frac{4^3}{3} - \frac{4^2}{2} - 6(4)\right] - \left[\frac{1}{3} - \frac{1}{2} - 6\right] = -\frac{9}{2} = -4.5$$

$$64/3 - 8 - 24 - 1/3 + 1/2 + 6$$

A particle moves along a line so that its velocity at time t is $v(t) = t^2 - t - 6$ (measured in meters per second).

Find the distance traveled during this time period.

$$\boxed{\left|\int_1^3 t^2 - t - 6\right|} + \left|\int_3^4 t^2 - t - 6\right| \rightarrow \frac{t^3}{3} - \frac{t^2}{2} - 6t$$

$$\left[\frac{3^3}{3} - \frac{3^2}{2} - 6(3)\right] - \left[\frac{1^3}{3} - \frac{1^2}{2} - 6(1)\right]$$

$$\left(-27/2\right) - \left(-37/6\right) = \left|-\frac{22}{3}\right| = \frac{22}{3}$$

$$\left|\int_3^4 t^2 - t - 6\right| \rightarrow \frac{t^3}{3} - \frac{t^2}{2} - 6t$$

$$\left[\frac{4^3}{3} - \frac{4^2}{2} - 6(4)\right] - \left[-\frac{27}{2}\right]$$

$$-\frac{32}{3} + \frac{27}{2} = \boxed{\frac{17}{6}}$$

$$\frac{22}{3} + \frac{17}{6} = \boxed{\frac{61}{6}}$$