NallPro® Education Centre

COMPUTER Training & MATH Tuition

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 Name:

Definite Integral Notation:

If the function $f(x)$ is continuous at every point on the interval [a, b] and $F(x)$ is any anti-derivative of $f(x)$ on [a,b],

then $\int_a^b f(x)dx$ is called the **definite integral** and is equal to $\int_a^b f(x)dx = \left[F(x)\right]_a^b = F(b) - F(a)$

Example: Evaluate $\int_2^4 \left(x + \frac{1}{x}\right)^2 dx$

$$\int_2^4 \left(x + \frac{1}{x}\right)^2 dx = \int_2^4 \left(x^2 + 2 + \frac{1}{x^2}\right) dx = \left[\frac{1}{3}x^3 + 2x - \frac{1}{x}\right]_2^4$$

$$= \left(\frac{1}{3}(4)^3 + 2(4) - \frac{1}{4}\right) - \left(\frac{1}{3}(2)^3 + 2(2) - \frac{1}{2}\right)$$

$$= \left(\frac{64}{3} + 8 - \frac{1}{4}\right) - \left(\frac{8}{3} + 4 - \frac{1}{2}\right)$$

$$= \frac{275}{12} \; (\approx 22.92)$$

Show all your details work on separate sheet(s) (8½ x 11):

1. Evaluate the following:

(a) $\int_1^4 x\,dx$ (b) $\int_4^9 \sqrt{x}\,dx$ (c) $\int_2^3 \frac{2}{x^3}dx$ (d) $\int_{16}^9 \frac{4}{\sqrt{x}}dx$

2. Evaluate the following definite integrals (giving exact answers)

(a) $\int_1^2 \left(x^2 - \frac{3}{x^4}\right)dx$ (b) $\int_0^2 (x\sqrt{x} - x)dx$ (c) $\int_0^2 (1 + 2x - 3x^2)dx$

(d) $\int_{-2}^0 (x + 1)dx$ (e) $\int_0^{-1} x^3(x + 1)dx$ (f) $\int_{-1}^1 (x + 1)(x^2 - 1)dx$

(g) $\int_1^4 (\sqrt{x} - 1)^2 dx$ (h) $\int_1^2 \left(x - \frac{1}{x}\right)^2 dx$ (i) $\int_1^3 \left(\frac{x^3 - x^2 + x}{x}\right)dx$

(j) $\int_{-1}^1 (x - x^3)dx$ (k) $\int_1^4 \frac{x + 1}{\sqrt{x}}dx$ (l) $\int_1^4 \left(\sqrt{\frac{2}{x}} - \sqrt{\frac{x}{2}}\right)dx$

3. Find the indefinite integral of

(a) $\int_1^2 \frac{3}{x}dx$ (b) $\int_0^4 \frac{2}{x + 1}dx$ (c) $\int_2^6 \frac{x + 4}{x}dx$

(d) $\int_4^5 \left(x^2 + \frac{1}{x}\right)^2 dx$ (e) $\int_{-1}^0 \frac{3}{1 - 2x}dx$ (f) $\int_0^1 \frac{2}{x + 1}dx$

(g) $\int_0^1 \frac{2}{(x + 1)^3}dx$ (h) $\int_2^4 \left(\sqrt{x} - \frac{2}{\sqrt{x}}\right)^2 dx$ (i) $\int_3^4 \frac{2x + 1}{2x^2 - 3x - 2}dx$