Integration 1

1. Integrate the following with respect to x.

(a) $3x^2$ (b) $5x^4$ (c) $6x^2$ (d) $8x^5$ (e) $10x^3$
(f) $4x^{-2}$ (g) $5x^{-2}$ (h) $12x^{-3}$ (i) $8x^{-5}$ (j) $2x^{-5}$

2. Integrate with respect to x.

(a) $x^2 + 3x + 1$ (b) $3x^2 - 5x - 2$ (c) $8x^2 + 9x - 5$ (d) $x^3 + 3x$
(e) $(x + 1)^2$ (f) $(x - 3)^2$ (g) $(3x + 4)^2$

3. Write in the correct form and integrate

(a) $\int \frac{4}{x^2}\,dx$ (b) $\int \frac{5}{x^3}\,dx$ (c) $\int \frac{10}{x^6}\,dx$ (d) $\int \frac{9}{x^4}\,dx$ (e) $\int \frac{8}{3x^3}\,dx$ (f) $\int \frac{6}{4x^3}\,dx$

4. Explain why you always get a constant of integration when you integrate an indefinite integral.

5. Evaluate

(a) $\int x^{\frac{1}{3}}\,dx$ (b) $\int x^{\frac{2}{5}}\,dx$ (c) $\int 3x^{\frac{2}{3}}\,dx$ (d) $\int 2x^{\frac{2}{7}}\,dx$

6. Evaluate each definite integral

(a) $\int_1^4 2x^2\,dx$ (b) $\int_0^2 4x^2 + 2x\,dx$ (c) $\int_2^6 3x^2 + x - 2\,dx$

(d) $\int_3^5 8x + 4x^2\,dx$ (e) $\int_{-2}^2 5x^2 - 3x\,dx$ (f) $\int_{-5}^1 3x^{-4} + 5x\,dx$

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

7. Calculate the value of a in each question

(a) $\int_0^a x^2\,dx = 9$ (b) $\int_0^a 4x - 5\;dx = 3$ (c) $\int_0^a 3\sqrt[3]{x^2}\,dx = \frac{9}{5}$

(d) $\int_0^a 3\sqrt{x}\,dx = 2$ (e) $\int_a^{2a} 1 + 2x\;dx = 24$