Answer on Question #59214 – Math – Calculus

Question

(a) Differentiate the equation θ = 9t² − 2t³ with respect to t.

(b) Differentiate the equation y = 3 sin 5t with respect to t.

(c) Differentiate the equation y = $2e^{6t}$ with respect to t.

(d) Determine $\int x^7 dx$.

(e) Determine $\int (5\sin 3t - e^{3t})$ dt.

Solution

(a) $\frac{d\theta}{dt} = (9t^2 - 2t^3)' = 2 \cdot 9t - 3 \cdot 2t^2 = 18t - 6t^2$;

(b) $\frac{dy}{dt} = (3\sin 5t)' = 3\cos(5t) \cdot 5 = 15\cos 5t$;

(c) $\frac{dy}{dt} = (2e^{6t})' = 2e^{6t} \cdot 6 = 12e^{6t}$;

(d) $\int x^7 dx = \frac{x^8}{8} + C$, where C is an integration constant;

(e) $\int(5\sin 3t - e^{3t})dt = -\frac{5}{3}\cos 3t - \frac{1}{3}e^{3t} + C = -\frac{1}{3}(5\cos 3t + e^{3t}) + C$, where C is an integration constant.

Answer:

(a) $\frac{d\theta}{dt} = 18t - 6t^2$;

(b) $\frac{dy}{dt} = 15\cos 5t$;

(c) $\frac{dy}{dt} = 12e^{6t}$;

(d) $\int x^7 dx = \frac{x^8}{8} + C$;

(e) $\int(5\sin 3t - e^{3t})dt = -\frac{1}{3}(5\cos 3t + e^{3t}) + C$.