

(63) Integration by Inspection (Reverse Chain Rule)

WORKING AT D/E

(1) Find the integral of each of the following 'by inspection'

(a) $\int 2e^{2x} dx$ (b) $\int \frac{2x}{x^2+1} dx$ (c) $\int 4(2x+1)^5 dx$

(d) $\int -3\sin x(\cos x + 1)^2 dx$ (e) $\int 8 \sin 2x dx$

(2) Explain why $\int (\cos x) \sin^5 x dx = \frac{1}{6} \sin^6 x + c$

(3) Show each of the following:

(a) $\int_1^2 \frac{4x-1}{2x^2-x} dx = \ln 6$

(b) $\int_0^3 4xe^{x^2} dx = 2e^9 - 2$

WORKING AT B/C

(1) (a) Using the formula book, write down $\frac{d}{dx} \sec x$.

(b) Hence, find $\int \tan x \sec^6 x dx$

(2) Evaluate $\int_0^1 2x(2x^2 - 3)^5 dx$ showing each step of your workings.

(3) Show that $\int_0^{\frac{\pi}{2}} -\sin x \cos^3 x dx = -0.25$

WORKING AT A*/A

(1) Find $\int \cot 2x \operatorname{cosec}^6 2x dx$

(2) Show that $\int_0^1 \frac{e^{2x}}{e^{2x}+1} dx = \ln \sqrt{\frac{e^2+1}{2}}$

(3) Show that $\int_{\frac{\pi}{6}}^{\frac{\pi}{4}} \operatorname{cosec}^2 x \cot^3 x dx = 2$