

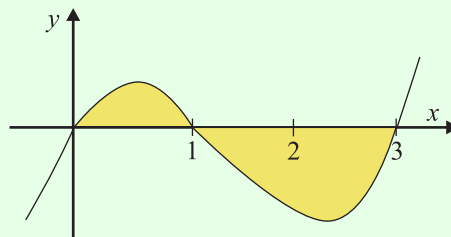
INTEGRATION (Q 8, PAPER 1)

2010

8 (a) Find $\int (\sin 2x + e^{4x}) dx$.

(b) The curve $y = 12x^3 - 48x^2 + 36x$ crosses the x -axis at $x = 0$, $x = 1$ and $x = 3$, as shown.

Calculate the total area of the shaded regions enclosed by the curve and the x -axis.



(c) (i) Find, in terms of a and b ,

$$I = \int_a^b \frac{\cos x}{1 + \sin x} dx$$

(ii) Find in terms of a and b ,

$$J = \int_a^b \frac{\sin x}{1 + \cos x} dx.$$

(iii) Show that if $a + b = \frac{\pi}{2}$, then $I = J$.

ANSWERS

8 (a) $-\frac{1}{2} \cos 2x + \frac{1}{4} e^{4x} + c$

(b) 37

(b) (i) $I = \log_e \left(\frac{1 + \sin b}{1 + \sin a} \right)$ (ii) $J = \log_e \left(\frac{1 + \cos a}{1 + \cos b} \right)$