INTEGRATION (Q 8, PAPER 1)

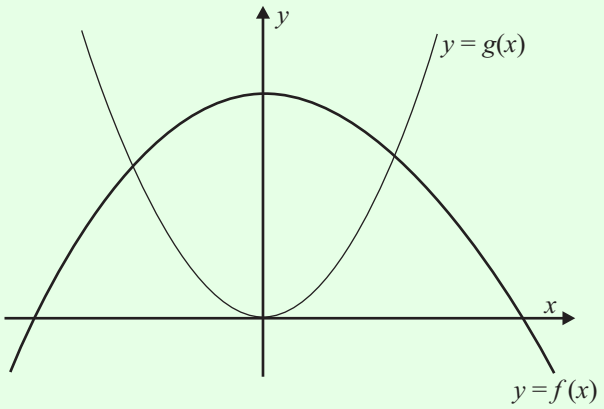
LESSON NO. 7: APPLICATIONS OF INTEGRATION I: AREA

2006

8 (c) The diagram shows the graphs of the curves $y = f(x)$ and $y = g(x)$, where $f(x) = 12 - 3x^2$ and $g(x) = 9x^2$.

(i) Calculate the area of the region enclosed by the curve $y = f(x)$ and the x-axis.

(ii) Show that the region enclosed by the curves $y = f(x)$ and $y = g(x)$ has half that area.

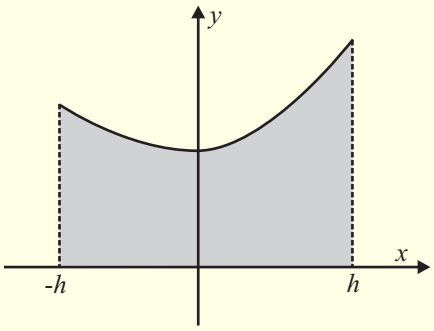


2004

8 (c) The graph of the function $f(x) = ax^2 + bx + c$ from $x = -h$ to $x = h$ is shown in the diagram.

(i) Show that the area of the shaded region is $\frac{h}{3}[2ah^2 + 6c]$.

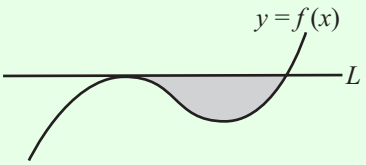
(ii) Given that $f(-h) = y_1$, $f(0) = y_2$ and $f(h) = y_3$, express the area of the shaded region in terms of y_1, y_2, y_3 and h.



2002

8 (c) Let $f(x) = x^3 - 3x^2 + 5$.

L is the tangent to the curve $y = f(x)$ at its local maximum point.
Find the area enclosed between L and the curve.



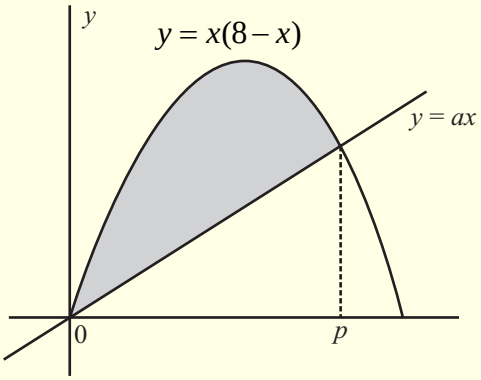
2001

8 (c) a is a real number such that $0 < a < 8$.

The line $y = ax$ intersects the curve $y = x(8-x)$ at $x = 0$ and at $x = p$.

(i) Show that $p = 8 - a$.

(ii) Show that the area between the curve and the line is $\dfrac{p^3}{6}$ square units.



ANSWERS

2006 8 (c) (i) 32

2004 8 (c) (ii) $A = \frac{h}{3}[y_1 + 4y_2 + y_3]$

2002 8 (c) $\frac{27}{4}$