



EXAM PAPERS PRACTICE

Boost your performance and confidence with these topic-based exam questions

Practice questions created by actual examiners and assessment experts

Detailed mark scheme

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2002

XVIII

1583

Time allowed

Score

Percentage

/

%

Maths

AQA
AS & A LEVEL

Topic Questions

3.9 H: Integration



3 (a) (i) Given that $f(x) = x^4 + 2x$, find $f'(x)$. (1 mark)

(ii) Hence, or otherwise, find $\int \frac{2x^3 + 1}{x^4 + 2x} dx$. (2 marks)

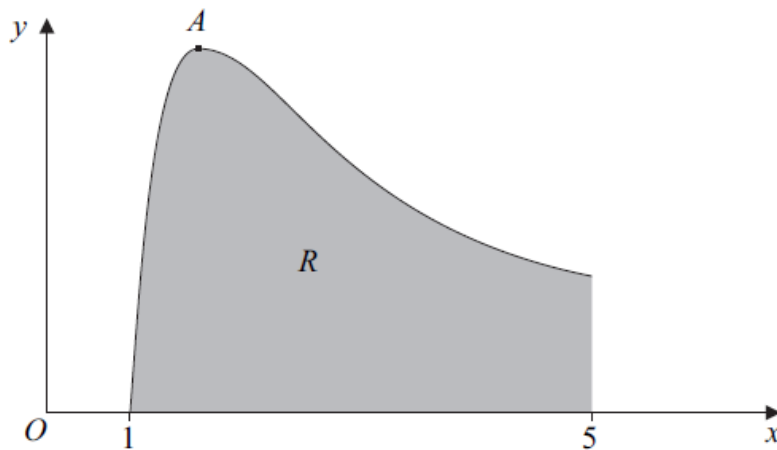
(b) (i) Use the substitution $u = 2x + 1$ to show that

$$\int x\sqrt{2x+1} dx = \frac{1}{4} \int \left(u^{\frac{3}{2}} - u^{\frac{1}{2}} \right) du \quad (3 \text{ marks})$$

(ii) Hence show that $\int_0^4 x\sqrt{2x+1} dx = 19.9$ correct to three significant figures. (4 marks)

(b) Using integration by parts, find $\int x^{-2} \ln x dx$. (4 marks)

(c) The sketch shows the graph of $y = x^{-2} \ln x$.

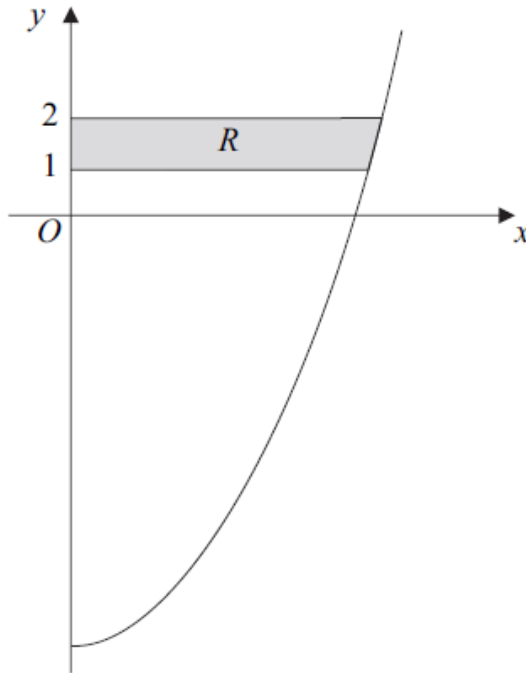


(ii) The region R is bounded by the curve, the x -axis and the line $x = 5$. Using your answer to part (b), show that the area of R is

$$\frac{1}{5}(4 - \ln 5) \quad (3 \text{ marks})$$

(b) Use the substitution $u = 2x + 1$ to find $\int x(2x + 1)^8 dx$, giving your answer in terms of x . (4 marks)

- 4 (a) Use integration by parts to find $\int x \sin x \, dx$. (4 marks)
- (b) Using the substitution $u = x^2 + 5$, or otherwise, find $\int x\sqrt{x^2 + 5} \, dx$. (4 marks)
- (c) The diagram shows the curve $y = x^2 - 9$ for $x \geq 0$.



The shaded region R is bounded by the curve, the lines $y = 1$ and $y = 2$, and the y -axis.

Find the exact value of the volume of the solid generated when the region R is rotated through 360° about the y -axis. (4 marks)

- 6 (a) Use integration by parts to find $\int xe^{5x} \, dx$. (4 marks)

- (b) (i) Use the substitution $u = \sqrt{x}$ to show that

$$\int \frac{1}{\sqrt{x}(1 + \sqrt{x})} \, dx = \int \frac{2}{1 + u} \, du \quad (2 \text{ marks})$$

- (ii) Find the exact value of $\int_1^9 \frac{1}{\sqrt{x}(1 + \sqrt{x})} \, dx$. (3 marks)