8.1 Integration

Question Paper

Course	Edexcel IAL Maths: Pure 2
Section	8. Integration
Topic	8.1 Integration
Difficulty	Hard

Time allowed: **80**

Score: **/68**

Percentage: **/100**

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Question 1

Use calculus to find the value of

$$\int_4^9 \frac{x^2 + 1}{\sqrt{x}} \, dx$$

[5 marks]

Question 2

Given

$$\int_1^p (1 + \frac{1}{x^2}) \, dx = \frac{15}{4}$$

find the value of the constant p, where $p > 0$.

[5 marks]

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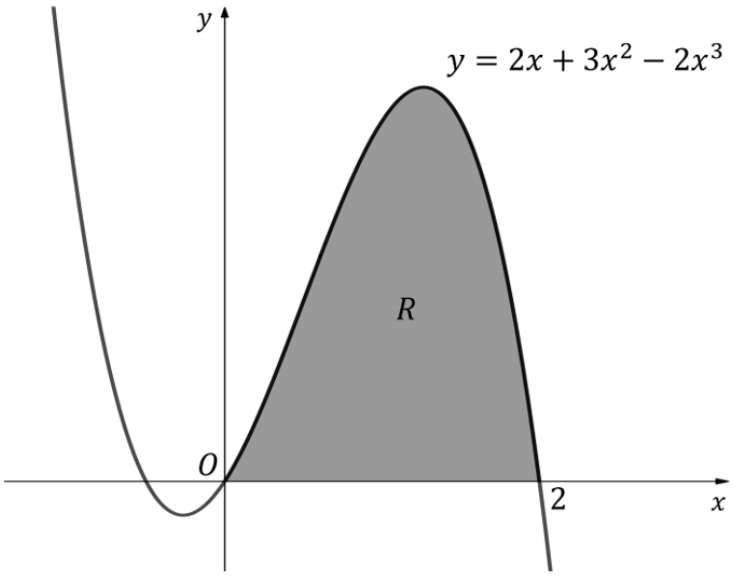
Question 3

The diagram below shows part of the graph of $y = 2x + 3x^2 - 2x^3$.



Find the area of the shaded region labelled R.

[4 marks]

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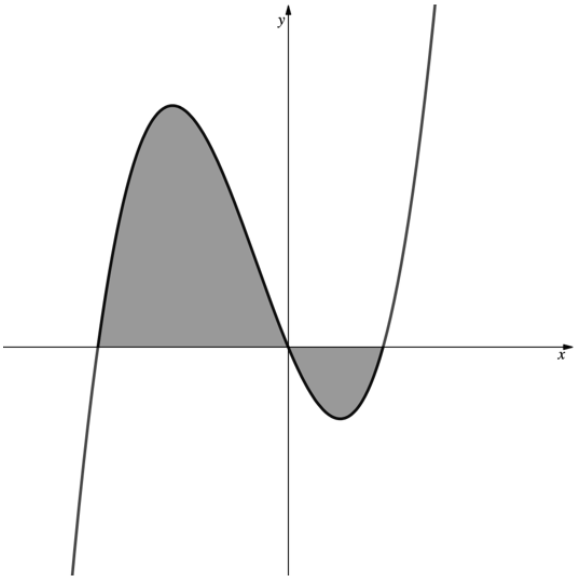
Question 4

The diagram below shows part of the graph of $y = x(x-1)(x+2)$.
Find the total area of the two shaded regions.



[8 marks]

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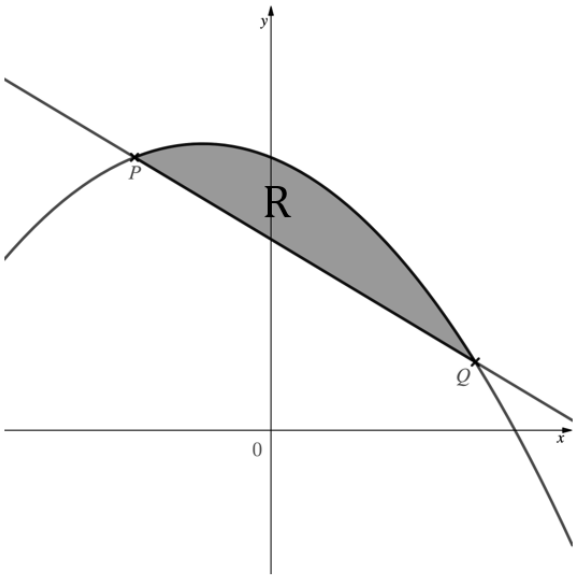
Question 5

The line with equation $5y = 14 - 3x$ cuts the curve with equation $5y = 20 - 2x - x^2$ at the points P and Q, as shown.



(a) Find the x- and y-coordinates of the points P and Q.

[5 marks]

Question 5

(b) Find the exact area of the region labelled R, giving your answer in the form $\frac{a}{b}$, where a and b are integers to be found.

[6 marks]

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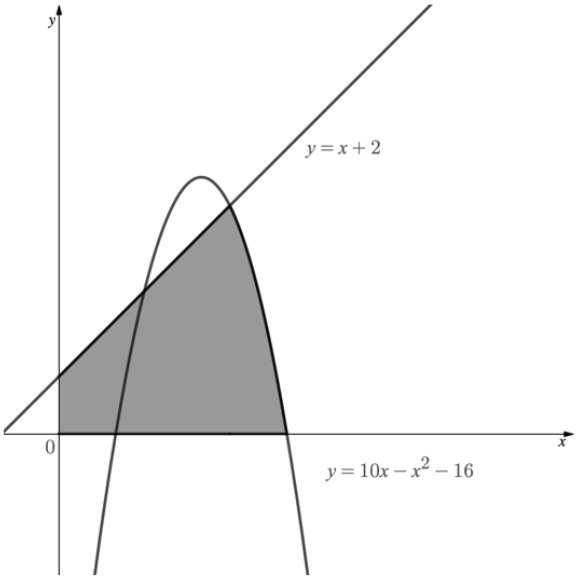
Question 6

The diagram below shows the graphs of $y = x + 2$ and $y = 10x - x^2 - 16$.



Find the exact area of the shaded region.

[11 marks]

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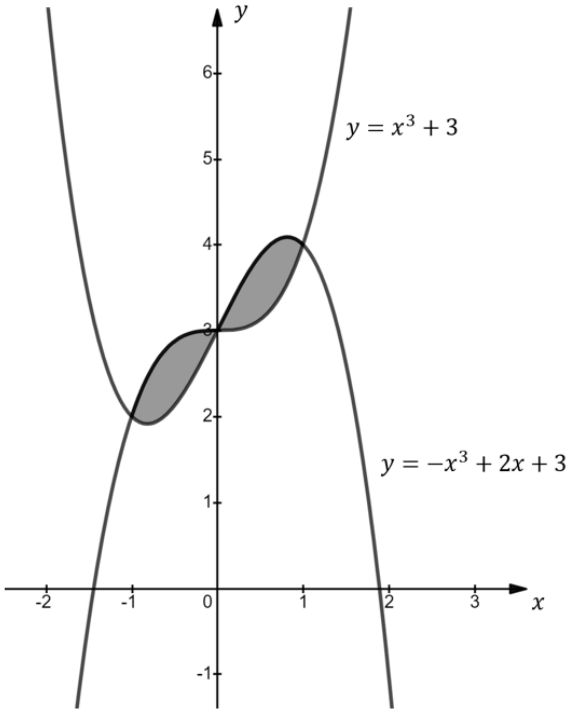
Question 7

The diagram below shows a sketch of the curves with equations

$$y = x^3 + 3 \quad \text{and} \quad y = -x^3 + 2x + 3$$



(a) Find the x-coordinates of the points of intersection of the two graphs.

[2 marks]

Question 7

(b) Use calculus to find the total shaded area enclosed by the two graphs.

[5 marks]

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Question 8

The trapezium rule is to be used to find an estimate for the integral

$$\int_4^8 \mathrm{f}(x)\ \mathrm{d}x$$

The table below shows values for x and $\mathrm{f}(x)$, rounded to three significant figures where appropriate.

x	4	4.5	5	5.5	6	6.5	7	7.5	8
$\mathrm{f}(x)$	3.16	3.39	3.61	3.81	4	4.18	4.36	4.53	4.69

(a) Using the values in the table find

(i) an estimate for the integral using 2 strips,

(ii) an estimate for the integral using 4 strips,

(iii) an estimate for the integral using 8 strips.

[4 marks]

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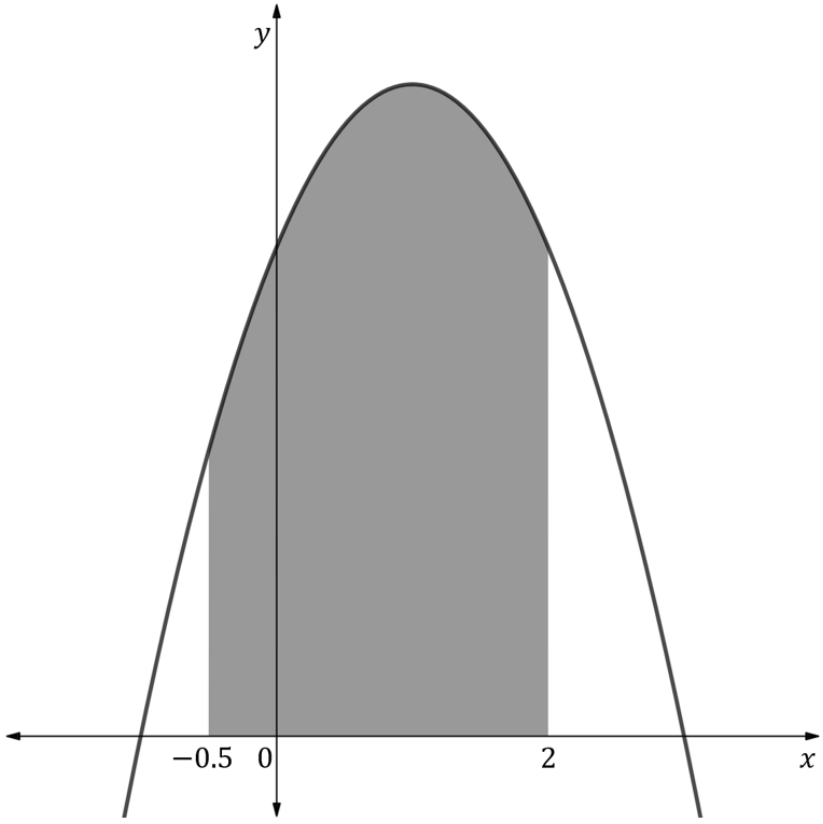
Question 8

(b) Justify which of the estimates from part (a) will be the most accurate estimate for the integral.

[2 marks]

Question 9

The diagram below shows part of the graph with equation $y = 3 + 2x - x^2$.



Use the trapezium rule with 5 strips to find an estimate for the shaded area, giving your answer to three significant figures.

[5 marks]

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Question 10

(a) Use the trapezium rule with $h = 0.25$ to find an estimate for the area bounded by the curve with equation $y = 1 + 2^x$, the x-axis and lines with equations $x = 1$ and $x = 2$. Give your answer to five significant figures.

[4 marks]

Question 10

(b) The integral

$$\int_1^2 (1 + 2^x)\ \mathrm{d}x$$

can be evaluated as 3.8854 to five significant figures. Using this as its exact value, calculate the percentage error of your estimate from part (a).

[2 marks]

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