



Scan for the solutions

Name: _____ **Date:** _____ **Score:** _____ / 68

1 Find $\int (6x^2 - 4x + 5) dx$, simplifying each term. (3 marks)

Answer _____

2 Find $\int (3\sqrt{x} + \frac{4}{x^3}) dx$, giving each term in its simplest form. (4 marks)

Answer _____

3 A curve with equation $y = f(x)$ passes through the point (2, 9)
Given that $f'(x) = 4x^3 - 6x + 1$, find $f(x)$ (4 marks)

Answer _____

4 Use algebraic integration to find the exact value of $\int_1^4 (2x - \frac{3}{\sqrt{x}}) dx$
Solutions relying entirely on calculator technology are not acceptable. (4 marks)

Answer _____

- 5 The curve C has equation $y = f(x)$, $x > 0$, and passes through the point $(1, 2)$

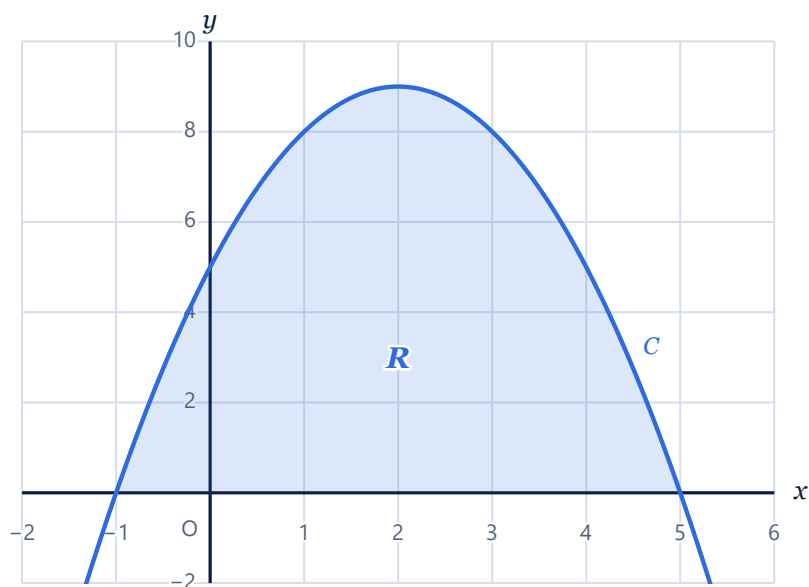
Given that $f'(x) = \frac{(x^2 + 2)^2}{x^2}$

- a. show that $f'(x) = x^2 + A + Bx^{-2}$ where A and B are constants to be found
b. find $f(x)$, simplifying each term.

(6 marks)

Answer _____

- 6 The curve C has equation $y = 5 + 4x - x^2$
The finite region R is bounded by C and the x -axis.
Use algebraic integration to find the area of R



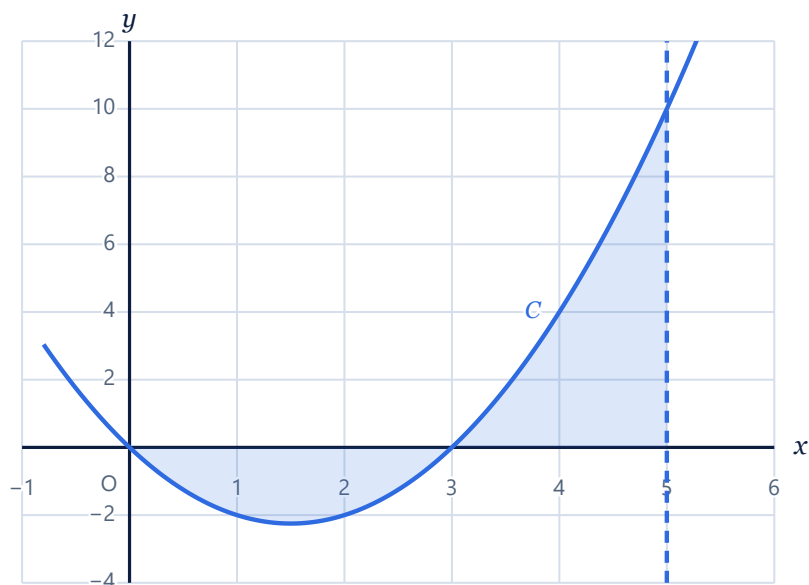
(5 marks)

Answer _____

7

The curve C has equation $y = x^2 - 3x$

- a. Find the total area of the regions bounded by C , the x -axis and the lines $x = 0$ and $x = 5$
- b. Find the value of $\int_0^5 (x^2 - 3x) \, dx$ and explain why it is not the same as your answer to part (a).



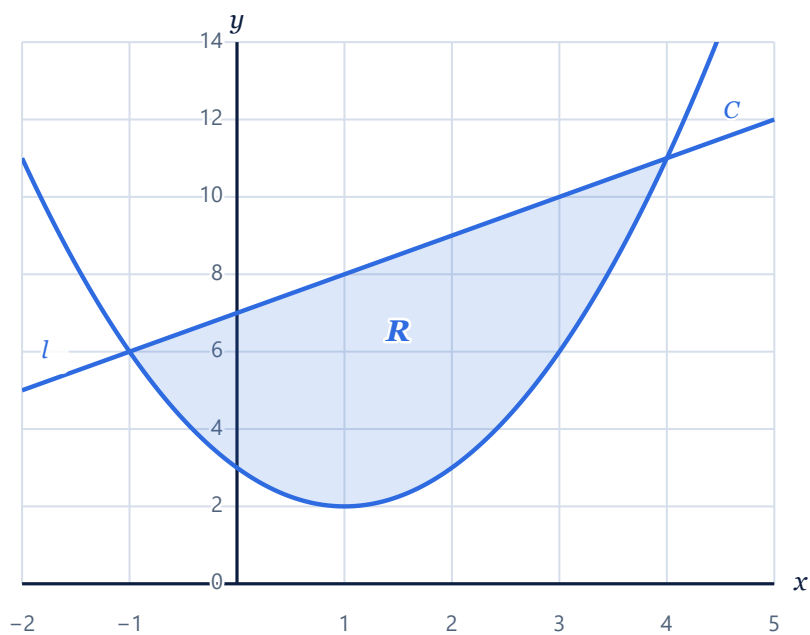
(6 marks)

Answer

8

The curve C has equation $y = x^2 - 2x + 3$ and the line l has equation $y = x + 7$

- Find the coordinates of the points where l meets C
- The finite region R is bounded by C and l . Use algebraic integration to find the exact area of R



(7 marks)

Answer _____

9

Given that $k > 2$ and $\int_2^k (3x^2 - 4) \, dx = 48$

- show that $k^3 - 4k - 48 = 0$
- Hence show that $k = 4$ is the only solution.

(5 marks)

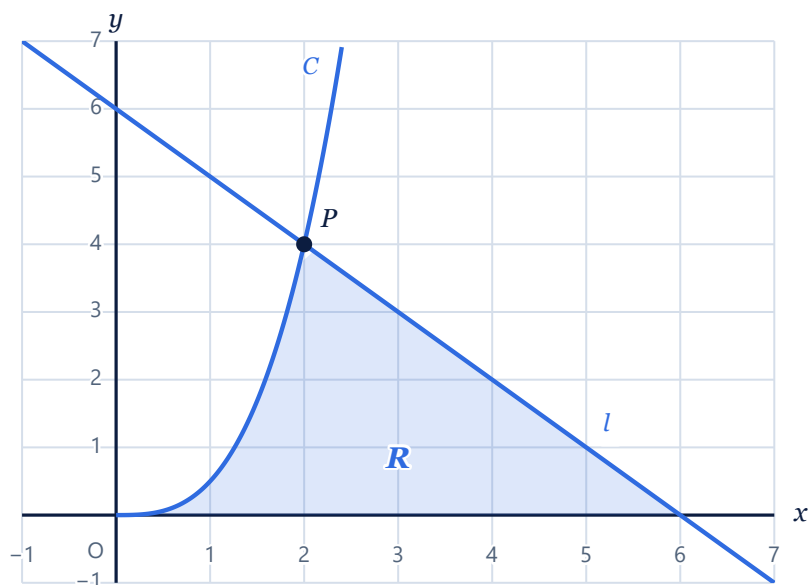
Answer _____

10

The curve C has equation $y = \frac{1}{2}x^3$, $x \geq 0$, and the line l has equation $y = 6 - x$

- Show that l meets C at exactly one point, $P(2, 4)$
- The region R is bounded by C , l and the x -axis. Find the area of R

Solutions relying entirely on calculator technology are not acceptable.



(7 marks)

Answer _____

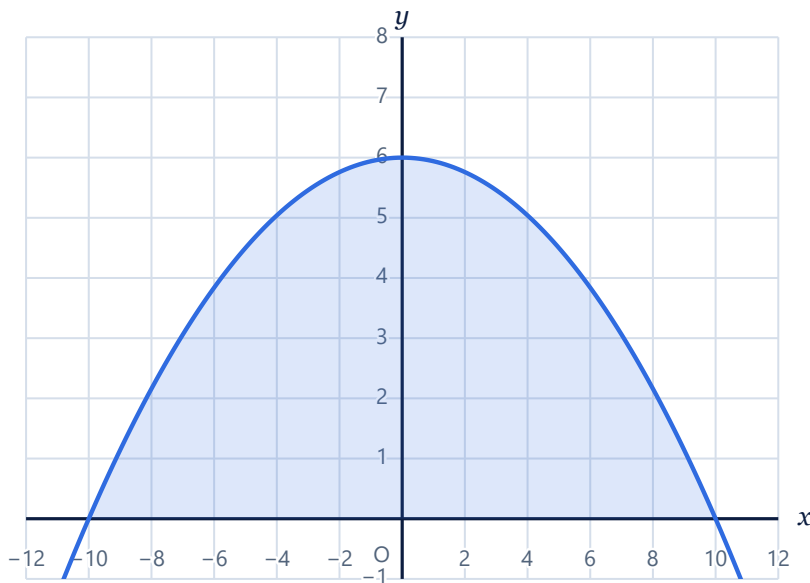
11

The entrance to a road tunnel is modelled by the region between the ground and the curve with equation

$$y = 6 - 0.06x^2$$

where x metres is the horizontal distance from the centre of the entrance and y metres is the height above the ground.

- Find the width of the tunnel at ground level.
- Use algebraic integration to find the area of the entrance.
- The tunnel is 50 m long and has the same cross-section all the way through. Find the volume of the tunnel.
- Give one reason why the model may not give an accurate answer for the amount of space available for traffic.



(8 marks)

Answer _____

12 The curve C has equation $y = x(k - x)$, where k is a positive constant.

a. Show that the area of the finite region bounded by C and the x -axis is $\frac{k^3}{6}$

The line l with equation $y = 2x$ meets C at the origin O and at the point P .

b. Find the x -coordinate of P in terms of k

c. Given that the finite region bounded by C and l has area 36, find the value of k

(9 marks)

Answer

End of questions | Total 68 marks