

Wednesday afternoon quiz

- (i) Given $x = \tan^2 4y$, $0 < y < \frac{\pi}{8}$, find $\frac{dy}{dx}$ as a function of x .

Write your answer in the form $\frac{1}{A(x^p + x^q)}$, where A , p and q are constants to be found.

(5)

- (ii) The volume V of a cube is increasing at a constant rate of $2 \text{ cm}^3 \text{ s}^{-1}$. Find the rate at which the length of the edge of the cube is increasing when the volume of the cube is 64 cm^3 .

(5)

Name The School



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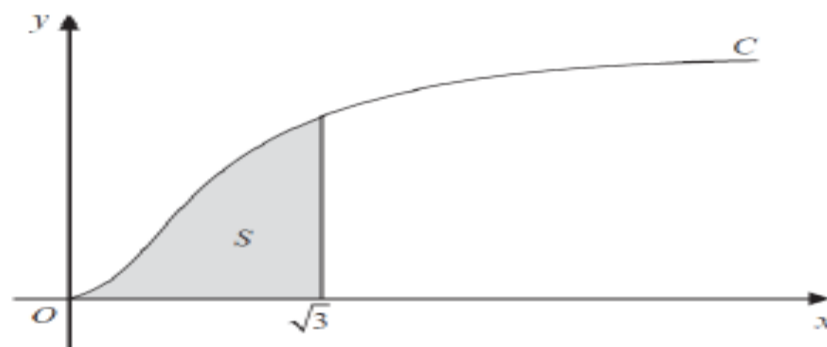


Figure 4

Figure 4 shows a sketch of part of the curve C with equation

$$y = \frac{x^2 \ln x}{3} - 2x + 4, \quad x > 0$$

The finite region S , shown shaded in Figure 4, is bounded by the curve C , the x -axis and the lines with equations $x = 1$ and $x = 3$.

- (a) Complete the table below with the value of y corresponding to $x = 2$. Give your answer to 4 decimal places.

x	1	1.5	2	2.5	3
y	2	1.3041		0.9089	1.2958

(1)

- (b) Use the trapezium rule, with all the values of y in the completed table, to obtain an estimate for the area of S , giving your answer to 3 decimal places.

(3)

- (c) Use calculus to find the exact area of S .

Give your answer in the form $\frac{a}{b} + \ln c$, where a , b and c are integers.

(6)

- (d) Hence calculate the percentage error in using your answer to part (b) to estimate the area of S . Give your answer to one decimal place.

(2)

- (e) Explain how the trapezium rule could be used to obtain a more accurate estimate for the area of S .

(1)



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Name The County

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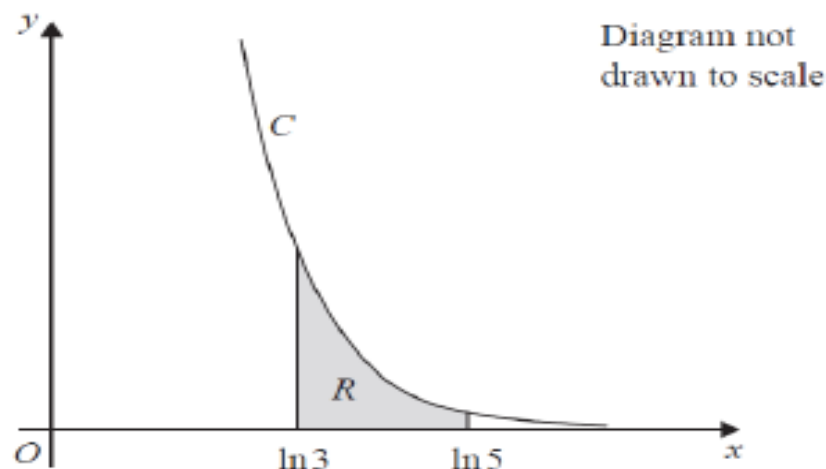


Figure 2

The curve C has parametric equations

$$x = \ln(t+2), \quad y = \frac{4}{t^2} \quad t > 0$$

The finite region R , shown shaded in Figure 2, is bounded by the curve C , the x -axis and the lines with equations $x = \ln 3$ and $x = \ln 5$.

(a) Show that the area of R is given by the integral

$$\int_1^3 \frac{\boxed{}}{t^2(t+\boxed{})} dt$$

State p
and q (3)

(b) Hence find an exact value for the area of R .

Write your answer in the form $(a + \ln b)$, where a and b are rational numbers.

(7)

(c) Find a cartesian equation of the curve C in the form $y = f(x)$.

(2)

Solve these equations

For every equation, solve for $0 \leq x \leq 360^\circ$

1) $\sin x + \cos x = 0$

2) $\cot x = 0$

3) $\sin x = 0.5$

4) $\sec x = 0$

5) $3 \sin x + 4 \cos x = 6$

8.

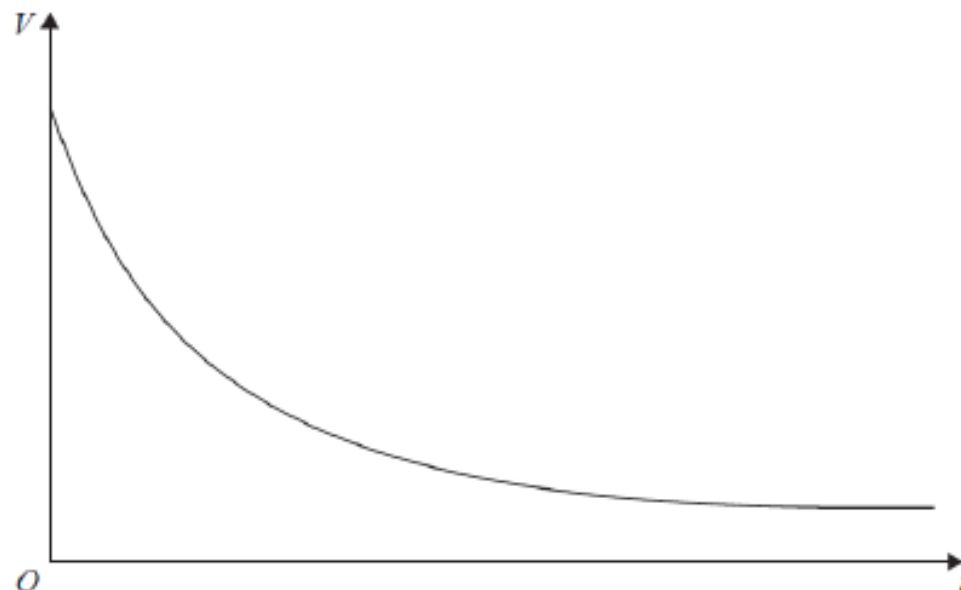


Figure 1

The value of Lin's car is modelled by the formula

$$V = 18\,000e^{-0.2t} + 4000e^{-0.1t} + 1000, \quad t \geq 0$$

where the value of the car is V pounds when the age of the car is t years.

A sketch of t against V is shown in Figure 1.

(a) State the range of V .

(2)

According to this model,

(b) find the rate at which the value of the car is decreasing when $t = 10$.

Give your answer in pounds per year.

(3)

(c) Calculate the exact value of t when $V = 15\,000$.

(4)

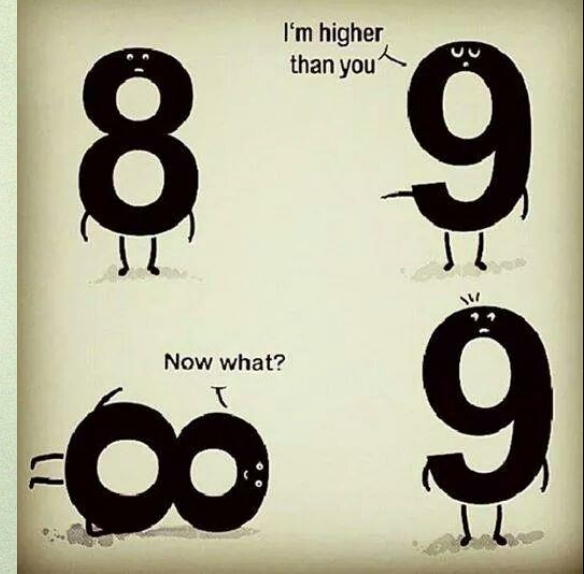
An opinion without

3.14159

is just an onion.



YOU HAVE
TO BE ODD
TO BE NUMBER
ONE



Teacher asks student: What is the half of 8?

Student: Miss horizontally or vertically?

Teacher: What do mean?

Student: Horizontally it is 0 and vertically it
is 3.



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How many of these jokes are funny?