

Core 2 - Trapezium rule

Challenge 1

Use the trapezium rule with five ordinates (four strips) to find an approximation to

$$\int_1^3 \frac{1}{x^3 + 3} dx$$

giving your answer to 3 significant figures.

(4 marks)



Challenge 2

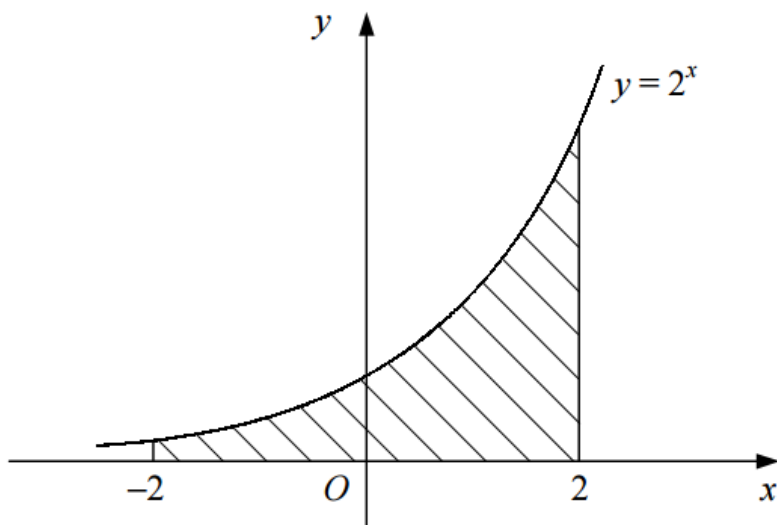


Figure 1

Figure 1 shows the curve with equation $y = 2^x$.

Use the trapezium rule with four intervals of equal width to estimate the area of the shaded region bounded by the curve, the x-axis and the lines $x = -2$ and $x = 2$.

(5)



Challenge 3

$$y = \sqrt{(10x - x^2)}.$$



- (a) Complete the table below, giving the values of y to 2 decimal places.

x	1	1.4	1.8	2.2	2.6	3
y	3	3.47			4.39	

(2)

- (b) Use the trapezium rule, with all the values of y from your table, to find an approximation

for the value of $\int_1^3 \sqrt{(10x - x^2)} \, dx$.

(4)

Final Challenge

The finite region R is bounded by the curve $y = 1 + 3\sqrt{x}$, the x -axis and the lines $x = 2$ and $x = 8$.

- (a) Use the trapezium rule with three intervals of equal width to estimate to 3 significant figures the area of R . (6)
- (b) Use integration to find the exact area of R in the form $a + b\sqrt{2}$. (5)
- (c) Find the percentage error in the estimate made in part (a). (2)

