

Section A (36 marks)

- 1 Express $\frac{x^2-1}{x} + \frac{1}{x+1}$ as a single fraction, simplifying your answer.

[3]

- 2 Fig. 2 shows the curve $y = \sqrt{1+x^2}$.

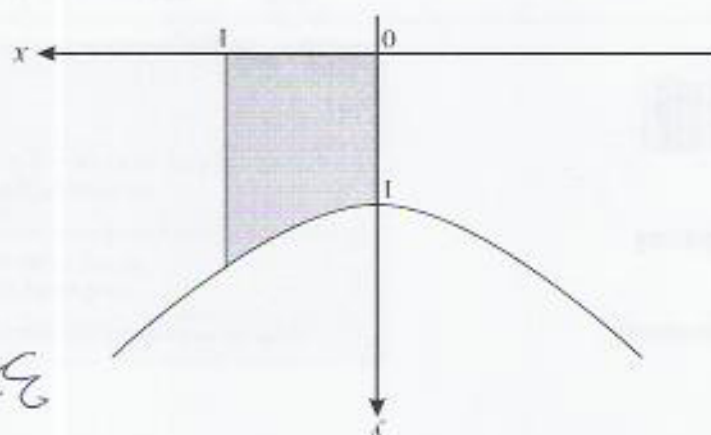


Fig. 2

- (i) The following table gives some values of x and y .

x	y
0	1
0.25	1.0308
0.5	
0.75	1.25
1	1.4142

Find the missing value of y , giving your answer correct to 4 decimal places.

Hence show that, using the trapezium rule with four strips, the shaded area is approximately 1.151 square units.

[3]

(ii) Jenny uses a trapezium rule with 8 strips, and obtains a value of 1.158 square units. Explain why she must have made a mistake.

[2]

(iii) The shaded area is rotated through 360° about the x -axis. Find the exact volume of the solid of revolution formed.

[3]

- 3 The parametric equations of a curve are

$$x = \cos 2\theta, \quad y = \sin \theta \cos \theta \quad \text{for } 0 \leq \theta < \pi.$$

Show that the cartesian equation of the curve is $x^2 + 4y^2 = 1$.

Sketch the curve.

[5]

- 4 Find the first three terms in the binomial expansion of $\sqrt{4+x}$ in ascending powers of x .

State the set of values of x for which the expansion is valid.

[5]