

Further Maths Revision Paper 2

This paper consists of 5 questions covering CP1, CP2, FP1 and FM1.
(AS Further Maths: Q4 and 5)

1

Use L'Hospital's Rule to calculate the

$$\lim_{x \rightarrow 0} \frac{1 - \cos x}{x^2}$$

2

Draw the polar curve

$$r^2 \sin 2\theta = 2c^2$$

marking key points on your sketch.

3

(a) Prove that

$$\frac{(2n+1)(2n+3)}{(n+1)(n+2)} - \frac{(2n-1)(2n+1)}{n(n+1)} = \frac{2(2n+1)}{n(n+1)(n+2)}$$

(b) Hence or otherwise show that the sum of the first n terms of the series

$$\frac{3}{1 \times 2 \times 3} + \frac{5}{2 \times 3 \times 4} + \dots$$

is

$$\frac{n(5n+7)}{4(n+1)(n+2)}$$

4

Use the midpoint formula with $h = 0.1$ to estimate the value at $x = 0.2$ of the particular solution to

$$\frac{dy}{dx} = \frac{e^x + y}{y + x^2} \text{ at } (0, 1)$$

correct to 4 decimal places.

Euler's iterative formula

$$y_{n+1} \approx y_n + h \left(\frac{dy}{dx} \right)_n$$

Midpoint iterative formula

$$y_{n+1} \approx y_{n-1} + 2h \left(\frac{dy}{dx} \right)_n$$

5

(a) Show that $P(5, 5, 3)$ and $Q(-1, 2, -3)$ are on opposite sides of the plane

$$\Pi_1 : 2x - 3y + 6z = 0$$

(b) Find where PQ meets the plane Π_1 .

(c) Find the equation of the plane which contains the line PQ and is perpendicular to Π_1