1. Solve the equation

$$z^5 = 32$$

Give your answers in the form $r(\cos\theta + i\sin\theta)$, where $r > 0$ and $0 \leqslant \theta < 2\pi$

(5)

(Total for Question 1 is 5 marks)

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2. **In this question you must show all stages of your working.**
Solutions relying entirely on calculator technology are not acceptable.

Use algebra to find the set of values of x for which

$$|x^2 - 9| < |1 - 2x|$$

(6)

(Total for Question 2 is 6 marks)

3.

$$(\cos x)\frac{dy}{dx} + (\sin x)y = 2\cos^3 x \sin x - 3 \qquad 0 \leqslant x < \frac{\pi}{2}$$

(a) Find the general solution of this differential equation.
Give your answer in the form $y = f(x)$.

(7)

(b) Find the particular solution of this differential equation for which $y = 3\sqrt{3}$ at $x = \frac{\pi}{3}$

Give your answer in the form $y = f(x)$.

(3)

(Total for Question 3 is 10 marks)
