Sample Paper 6: Paper 1

Question 2 (25 marks)

Question 2 (a)

$$z = \cos\left(\frac{\pi}{3}\right) + i\sin\left(\frac{\pi}{3}\right) = \frac{1}{2} + \frac{\sqrt{3}}{2}i$$

$$|1 + z| = \left|\frac{3}{2} + \frac{\sqrt{3}}{2}i\right| = \sqrt{\left(\frac{3}{2}\right)^2 + \left(\frac{\sqrt{3}}{2}\right)^2} = \sqrt{\frac{9}{4} + \frac{3}{4}} = \sqrt{\frac{12}{4}} = \sqrt{3}$$

Question 2 (b)

$$|z| = 5 \Rightarrow |x + iy| = 5$$

$$\therefore \sqrt{x^2 + y^2} = 5$$

$$x^2 + y^2 = 25$$

This is a circle with centre (0, 0) and radius 5.

$$z + \bar{z} = 8$$

$$x + iy + x - iy = 8$$

$$2x = 8$$

$$\therefore x = 4$$

This is a straight line.

$$A \cap B = \{4 + 3i,\ 4 - 3i\}$$