QUESTION 1

If the line y= √3 x + k touches the circle x² + y² = 16, then find the value of
Sol: Given line is y = √3 x + k and the circle is x² + y² = 16.

Centre of the circle is $(0, 0)$ and radius is 4.

Since the line $y = \sqrt{3}\,x + k$ touches the circle, perpendicular distance from $(0, 0)$ to line is equal to the radius of the circle.

$$\therefore \qquad \left|\frac{0-0+k}{\sqrt{3+1}}\right| = 4 \implies \pm\frac{k}{2} = 4 \implies k = \pm 8$$