1. Find the coordinates of the turning points of the curve with equation $y = x^3 - 3x^2 - 9x + 12$ and determine their nature.

   (7)

2. Show that the line with equation $y = 6 - 2x$ is a tangent to the circle with equation $x^2 + y^2 + 6x - 4y - 7 = 0$ and find the coordinates of the point of contact of the tangent and the circle.

   (5)

3. (a) Show that the line with equation $y = 3 - x$ is a tangent to the circle with equation $x^2 + y^2 + 14x + 4y - 19 = 0$.

   (b) Find the coordinates of the point of contact, P.

   (5)

4. Solve $2 \cos 2x - 5 \cos x - 4 = 0$ for $0 \leq x < 2\pi$.

   (5)