1. Differentiate the following functions with respect to x:

   (a) $y = x^2 \sin^{-1} x^3$

   (b) $y = x^4 \tan^{-1}(1 - x)$

   (c) $y = \tan^{-1}\left(\dfrac{2x}{3}\right)$

   (d) $y = \sin^{-1}\left(\dfrac{x}{4}\right)$

   (e) $y = \tan^{-1}\left(\dfrac{x-4}{x+4}\right)$

   (f) $y = \sin^{-1}\left(\dfrac{x-9}{x+9}\right)$

2. (a)   Use implicit differentiation to find $\dfrac{dy}{dx}$ if $4x^2 + 9xy + 5y^2 = 3$.

   (b)   Hence find the equation of the tangent at the point (-2, 1) on the curve $4x^2 + 9xy + 5y^2 = 3$.

3. Find the gradient of the tangent to the curve $\sin x + 4\cos y = 2\sqrt{3}$ at the point $(0, \frac{\pi}{6})$.