1. Differentiate the functions:
   (i). $f(x) = x^3 - \frac{1}{\sqrt[4]{x^3}}$
   (ii). $f(x) = \frac{\sin x}{2} + \frac{2}{x} + 3$
   (iii). $f(x) = x^3 \cos x$
   (iv). $f(x) = \frac{\sqrt{x}-1}{\sqrt{x}+1}$
   (v). $f(x) = x^2 \sin x \tan x$
   (vi). $f(x) = \frac{\cos x}{1-\sin x}$
2. Show that the curve $y = 6x^3 + 5x - 3$ has no tangent line with slope 4.
3. Find equations of the tangent line to the curve $y = \frac{x-1}{x+1}$ that are parallel to the line $x - 2y = 2$.
4. The cost function of producing $x$ units of goods is given by
$$C(x) = 1200 + 12x - 0.1x^2 + 0.0005x^3$$
   (a). Find the marginal cost function
   (b). Find $C'(200)$. What does it predict?
   (c). Estimate the extra cost when the production is increased from 200 to 202.
5. $A, B$ are constants. $y = A \sin x + B \cos x$ satisfies the equation
$$y'' + y' - 2y = 0$$
   Determine the value of $A$ and $B$.