

1. Determine $\frac{d^{200}}{dx^{200}}(\cos(2x))$

2. $\frac{d^3}{dx^3}(x \sin(4x))$

3. Determine $\frac{dy}{dx}$ of the following:

a) $\sin^3(3x^2 + 2y^3) + e^{x^3y^4} = 4$

b) $\sqrt{x^4y^3 - 2x^2 + 3y} - \tan^{-1}(x^2 + y^2) = 4$

4. Find equation of tangent line to the following curves at given points:

a) $y^2 = x^3(2-x)$ at $(1,1)$

b) $2(x^2 + y^2)^2 = 25(x^2 - y^2)$ at $(3,1)$

5. Determine the point(s) where the tangent line to the curve is either horizontal or vertical.

a) $x^2 + 4y^2 - 6x + 16y + 21 = 0$

6. Prove the following statements:

a) $\frac{d}{dx}(\tan^{-1} x) = \frac{1}{1+x^2}$

b) $\frac{d}{dx}(\sec^{-1}(x)) = \frac{1}{x\sqrt{x^2-1}}$