

Find dy/dx for the following curves:

$$x^2y + e^x = \cos(y) \quad (x^3 + y^3)^5 + x^2 = ye^x \quad \sin(x^2y) + y^2 = x^3 - 2e^y$$

Find the equation of the tangent line to the given curve at the specified point:

$$x^2 + xy + y^2 = 3 \text{ at } (1, 1) \quad x^2 + y^2 = (2x + 2y^2 - x^2)^2 \text{ at } (0, 1/2)$$

Use logarithmic differentiation to find the derivatives of the following functions:

$$f(x) = x^{\tan x} \quad g(x) = \frac{\sqrt{2x^3 + x^{-1/2}} (2x^3 + 5x)^2}{3x^8 + 17x^2} \quad h(x) = (3x^2 + 2 \sin x)^{x^2 + 1}$$

Find a linearization to the following functions at the specified point:

$$f(x) = \sin(2x) \text{ at } x = 0 \quad f(x) = \sqrt{1+x} \text{ at } x = 8$$

- Use a linear approximation to find a good estimate for $\sqrt{15}$.

Evaluate the following limits:

$$\lim_{x \rightarrow 9} \frac{\sqrt{x} - 3}{x - 9}$$

$$\lim_{x \rightarrow 1} \frac{x^3 + 2x - 3}{x - 1}$$

$$\lim_{x \rightarrow 0} \frac{\sin 3x}{2x}$$

$$\lim_{x \rightarrow 0} \frac{1 - \cos 2x}{x^2}$$

$$\lim_{x \rightarrow \infty} \sqrt{x^2 + x} - x$$

$$\lim_{x \rightarrow \infty} \left(1 + \frac{2}{x^2}\right)^x$$