Math 220 - Calculus f. Business and Management - Worksheet 13

Worksheet 13 - Definition and geometric interpretation of derivatives

Equations for a line

Exercise 1: *Find three forms of the equation for the line connecting the listed pairs of points. The forms are **point-slope** $(y - y_0 = m(x - x_0))$, **slope intercept** $(y = mx + b)$ and **general form** $(px + qy + r = 0)$.*

$$\textbf{1a}: (1, 1) \text{ and } (4, 64), \qquad \textbf{1b}: (2, 8) \text{ and } (4, 64), \qquad \textbf{1c}: (3, 27) \text{ and } (4, 64).$$

Notice that each pair of points is on the graph of $f(x) = x^3$.

Slope of the tangent to a curve

Exercise 2: *Find the slope of the line tangent to each curve at the given value of x.*

$$\textbf{2a}: f(x) = 2x^2 + x - 3 \quad \text{at } x = 4,$$

$$\textbf{2b}: f(x) = \begin{cases} 4x + 2 & \text{if } x < -2, \\ 3x & \text{if } x > -2 \end{cases} \quad \text{at } x = -3, -2, -1.$$

Derivatives

Exercise 3: *Find the derivative of each function. Then use it to find the line tangent to the curve at the given value of x.*

$$\textbf{3a}: f(x) = \sqrt{3x - 12} \quad \text{at } x = 2,\ x = 4,\ x = 6,$$

$$\textbf{3b}: f(x) = \frac{7}{2x} \quad \text{at } x = 0,\ x = 5.$$