

## Calculus Worksheet #2 Unit 1 Selected Solutions

Use the 4-step method to find  $f'(x)$  for each of the following functions. Show your work neatly organized on your work paper.

2.  $f(x) = 2x^2 - 7x + 3$

$$f(x + \Delta x) = 2(x + \Delta x)^2 - 7(x + \Delta x) + 3$$

$$f(x + \Delta x) = 2(x^2 + 2x\Delta x + \Delta x^2) - 7x - 7\Delta x + 3$$

$$f(x + \Delta x) = 2x^2 + 4x\Delta x + 2\Delta x^2 - 7x - 7\Delta x + 3$$

$$\begin{array}{r} f(x) = 2x^2 \qquad \qquad \qquad - 7x \qquad \qquad \qquad + 3 \\ \hline \end{array}$$

$$f(x + \Delta x) - f(x) = 4x\Delta x + 2\Delta x^2 - 7\Delta x$$

$$\frac{f(x + \Delta x) - f(x)}{\Delta x} = \frac{4x\Delta x + 2\Delta x^2 - 7\Delta x}{\Delta x} = 4x + 2\Delta x - 7$$

$$f'(x) = \lim_{\Delta x \rightarrow 0} (4x + 2\Delta x - 7)$$

$f'(x) = 4x - 7$

4.  $f(x) = x^3 + x^2 + x + 1$

$$f(x + \Delta x) = (x + \Delta x)^3 + (x + \Delta x)^2 + (x + \Delta x) + 1$$

$$f(x + \Delta x) = x^3 + 3x^2\Delta x + 3x\Delta x^2 + \Delta x^3 + x^2 + 2x\Delta x + \Delta x^2 + x + \Delta x + 1$$

$$\begin{array}{r} f(x) = x^3 \qquad \qquad \qquad + \qquad \qquad \qquad x^2 \qquad \qquad \qquad + \qquad \qquad \qquad x \qquad + \qquad \qquad 1 \\ \hline \end{array}$$

$$f(x + \Delta x) - f(x) = 3x^2\Delta x + 3x\Delta x^2 + \Delta x^3 + 2x\Delta x + \Delta x^2 + \Delta x$$

$$\frac{f(x + \Delta x) - f(x)}{\Delta x} = \frac{3x^2\Delta x + 3x\Delta x^2 + \Delta x^3 + 2x\Delta x + \Delta x^2 + \Delta x}{\Delta x}$$

$$\frac{f(x + \Delta x) - f(x)}{\Delta x} = 3x^2 + 3x\Delta x + \Delta x^2 + 2x + \Delta x + 1$$

$$f'(x) = \lim_{\Delta x \rightarrow 0} (3x^2 + 3x\Delta x + \Delta x^2 + 2x + \Delta x + 1)$$

$f'(x) = 3x^2 + 2x + 1$