Calculus   Worksheet #1   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.

1. $f(x) = 6x + 2$

$f(x + \Delta x) = 6(x + \Delta x) + 2$

$f(x + \Delta x) = 6x + 6\Delta x + 2$

$\underline{\quad f(x) \quad = 6x \qquad\quad + 2 \quad}$

$f(x + \Delta x) - f(x) = 6\Delta x$

$\dfrac{f(x + \Delta x) - f(x)}{\Delta x} = \dfrac{6\Delta x}{\Delta x} = 6$

$f'(x) = \underset{\Delta x \to 0}{LIM} \ (6)$

$\boxed{f'(x) = 6}$

6. $f(x) = x^2 - 3x + 6$

$f(x + \Delta x) = (x + \Delta x)^2 - 3(x + \Delta x) + 6$

$f(x + \Delta x) = x^2 + 2x\Delta x + \Delta x^2 - 3x - 3\Delta x + 6$

$\underline{\quad f(x) = x^2 \qquad\qquad\quad - 3x \qquad + 6 \quad}$

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

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

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

$f'(x) = \underset{\Delta x \to 0}{LIM} \ (2x + \Delta x - 3)$

$\boxed{f'(x) = 2x - 3}$

8. $f(x) = x^3$

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

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

$\underline{\quad f(x) = x^3 \qquad\qquad\qquad\qquad\qquad\qquad }$

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

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

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

$f'(x) = \underset{\Delta x \to 0}{LIM} \ (3x^2 + 3x\Delta x + \Delta x^2)$

$\boxed{f'(x) = 3x^2}$