Homework 2.3 – Definition and properties of the derivative

1. **(1 pt) alfredLibrary/AUCI/chapter2/lesson3/differencequotientbinomial10pet.pg**

Compute the derivative of $f(x) = x^2 + 3x + 9$ using the definition of the derivative function.

(HINTS: To enter Δx, type deltax (with no spaces). Write out your work on paper first, then enter your answers. Follow the step-by-step instructions. Copy and paste as much as you can to avoid typing errors. Check your answers frequently.)

$f'(x)$

$= \lim_{\Delta x \to 0} \dfrac{f(x+\Delta x) - f(x)}{\Delta x}$

In the first blank, substitute x $+\Delta x$ into f :

$= \lim_{\Delta x \to 0}$ _____ − _____

In the first blank, FOIL and eliminate parentheses

$= \lim_{\Delta x \to 0}$ _____ − _____

Cancel like terms in the numerator and simplify

$= \lim_{\Delta x \to 0}$ _____

Cancel like factors in the numerator and denominator:

$= \lim_{\Delta x \to 0}$ _____

Let $\Delta x \to 0$:

_____

2. **(1 pt) alfredLibrary/AUCI/chapter2/lesson3/derivcubic2p.pg**

Let $f(x) = 2x^3 + 3x - 10$.

(a) $f'(x) =$ _____.

(b) The slope of f at $x = -2$ is _____.

(c) The instantaneous rate of change of f at $x = -2$ is _____.

(d) The derivative of f at $x = -2$ is _____.

(e) $f'(-2) =$ _____.

3. **(1 pt) alfredLibrary/AUCI/chapter2/lesson3/derivcubic5pet.pg**

Let $f(x) = (2x^2 - 5)(6x + 6)$, and note that f is a product of two functions. Eventually we will derive a "product rule," but for now, you must multiply out the right-hand side before differentiating.

Therefore, $f'(x) =$ _____,

and $f'(4) =$ _____.

4. **(1 pt) alfredLibrary/AUCI/chapter2/lesson3/derivcubic6pet.pg**

If $f(x) = x^3 + 4x^2 + 3$,

then $f''(x) =$ _____.