2.2 Definition of the Derivative

Calculus Name: _____ **CA #1**

Find the derivative using limits. If the equation is given as $y =$, use Leibniz Notation: $\frac{dy}{dx}$. If the equation is given as $f(x) =$, use Lagrange Notation: $f'(x)$. WRITE SMALL!!

1. $f(x) = 5x + 1$

2. $y = 2 + 10x - x^2$

3. $f(x) = 5x^2 - x$

4. $f(x) = \sqrt{6x + 5}$

5. $y = \frac{1}{5-x}$

For each problem, create an equation of the tangent line of f at the given point. Leave in point-slope.

6. $f(1) = -5$ and $f'(1) = 3$

7. $f(6) = 2$ and $f'(6) = -8$

8. $f(x) = x \sin x$
   $f'(x) = \sin x + x \cos x$; $x = \pi$

9. $f(x) = \sqrt{5x+1}$ $f'(x) = \frac{5}{\sqrt{5x+1}}$; $x = 7$	10. $f(x) = 2x - 3x^2$ $f'(x) = 2 - 6x$; $x = -2$	11. $f(x) = \tan(5x)$ $f'(x) = 5\sec^2(5x)$; $x = \frac{\pi}{20}$

Identify the original function $f(x)$, and what value of c to evaluate $f'(c)$.

12. $\lim_{h\to 0} \frac{2^{5+h}-2^5}{h}$	13. $\lim_{h\to 0} \frac{2(6+h)^2+(6+h)-3-(75)}{h}$	14. $\lim_{x\to -3} \frac{(4x^2+2x)-(30)}{x+3}$	15. $\lim_{x\to 1} \frac{\frac{1}{10+x}-\frac{1}{11}}{x-1}$

Answers to 2.2 CA #1

1. $f'(x) = 5$	2. $\frac{dy}{dx} = 10 - 2x$	3. $f'(x) = 10x - 1$	4. $f'(x) = \frac{3}{\sqrt{6x+5}}$	5. $\frac{dy}{dx} = \frac{1}{(5-x)^2}$
6. $y + 5 = 3(x - 1)$	7. $y - 2 = -8(x - 6)$	8. $y = -\pi(x - \pi)$	9. $y - 6 = \frac{5}{6}(x - 7)$	10. $y + 16 = 14(x + 2)$
11. $y - 1 = 10(x - \frac{\pi}{20})$	12. $f(x) = 2^x$ $f'(5)$	13. $f(x) = 2x^2 + x - 3$ $f'(6)$	14. $f(x) = 4x^2 + 2x$ $f'(-3)$	15. $f(x) = \frac{1}{10+x}$ $f'(1)$