Calculus H Name _____

Ch. 3 #1

1. Find $\lim_{x \to 9} \frac{x^2 - 81}{x - 9}$

2. Sketch a graph with a step discontinuity at x = 3

3. Sketch a graph with a cusp at the point (5, 2)

For #4 – 11, use the definition of derivative to calculate $f'(c)$ exactly.

4. $f(x) = x^2 + 5x + 1$, $c = -2$

5. $f(x) = x^2 + 6x - 2$, $c = -4$

6. $f(x) = x^3 - 4x^2 + x + 8$, $c = 1$

7. $f(x) = x^3 - x^2 - 4x + 6$, $c = -1$

8. $f(x) = -0.7x + 2$, $c = 3$

9. $g(x) = 1.3x - 3$, $c = 4$

10. $f(x) = 5$, $c = -1$

11. $f(x) = -2$, $c = 3$

12. From the results of #8 & 9, what can you conclude about the derivative of a linear function? How does this conclusion relate to derivatives and tangent lines?

13. From the results of #10 & 11, what can you conclude about the derivative of a constant function? How does this conclusion relate to derivatives and tangent lines?

14. Let f be the piecewise function: $f(x) = \begin{cases} \dfrac{x^2 - x - 6}{x - 3}, & x \neq 3 \\ 7, & x = 3 \end{cases}$

a. Graph f(x) on your graphing calculator. What happens at x = 3?

b. Write the difference quotient for $f'(3)$. Graph this on your graphing calculator.

c. Make a table of values of the difference quotient for values of x close to 3 on both sides of 3. Based on your work, explain why the function has no derivative at x = 3.