Analysis H – Hahn / Hlasek / Tantod How should _____ handle the too-bright limit? Dim it.
Biggerish Quiz on Ch 9: Calculus _____ Period: _____
NO CALCULATORS 56 pts

1. A certain function has the values as shown in the table below.

x	3	5	8	11
f(x)	30	20	5	2

a) What is the average rate of change of the function for the x-interval [3,11]? [2 pts]

b) Use a backwards (left) difference quotient to approximate the IROC of f(x) at x = 5. [2 pts]

c) Consider the statement, "$f(c) = 15$ for some c value: 5 < c < 8". Is this statement TRUE or FALSE? Provide mathematical justification (with appropriate vocabulary) for your answer. [2 pts]

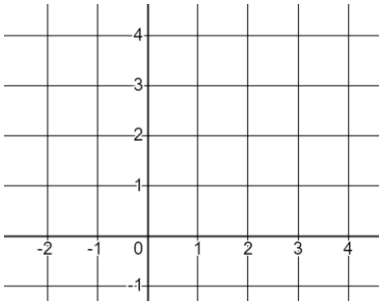
d) Suppose f(x) modeled the acceleration of a particle (in meters per second^2) over the time interval of x (in seconds). Use 3 trapezoids to approximate the definite integral of f(x) over [3,11]. Give your answer as a single number, and include units in your answer. [4 pts]

2. Consider the function $f(x) = \frac{1}{x}$. Use the Formal Definition of Derivative at a point to find $f'(4)$. In order to receive full credit, you need to show all your work and use proper notation throughout. [3 pts]

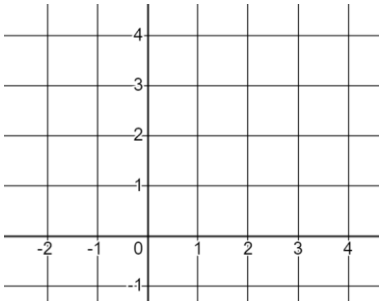
3. Consider the function $g(x) = -2x^3 + 5x^2 + 9$. Use the Formal Definition of Derivative to find $g'(4)$. In order to receive full credit, you need to show all your work and use proper notation throughout. [3 pts]

4. For each of the following, draw a function to fit the description. [1 pt each]

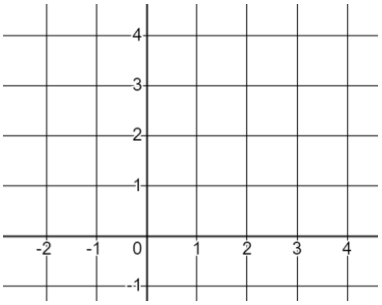
a) f(3) exists, but the limit as x approaches 3 does not exist.



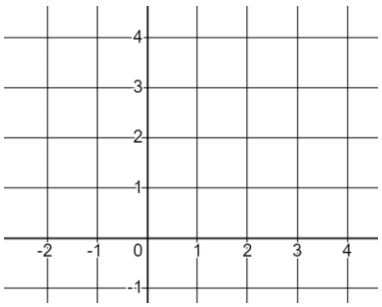
b) there is a limit as x approaches 3, but f(3) does not exist.



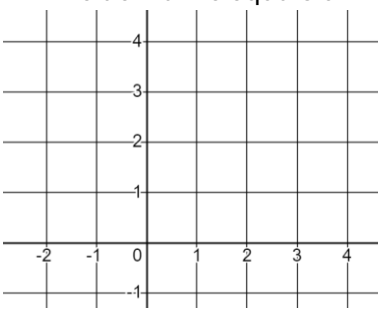
c) there is a limit as x approaches 3 and f(3) exists, but the function is not continuous.



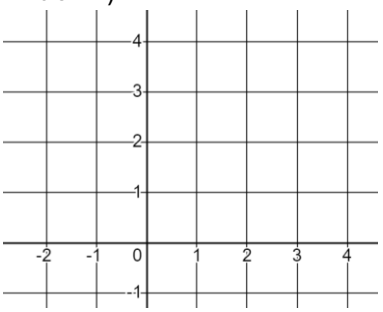
d) Using trapezoids to find the definite integral over the interval [0, 3] would result in an overestimate of the true value.



e) The derivative exists for all values in the interval [-2, 3], and there are exactly 4 values in the interval [-2, 3] for which the derivative equals 0.



f) The derivative of the function is a parabola whose vertex is its maximum value (the parabola is pointing down).



5. Fill in the blanks to complete the Definition of a Limit. [3 pts total]

$\lim_{x \to c} f(x) = L$ if and only if for all values of _____, there exists a _____ such that if _____ is

within _____ of _____, but not equal to _____, then _____ will be within _____ of _____.

6. Consider the function $f(x) = \sqrt{x-2} + 5$.

a) $\lim_{x \to 18} f(x) =$ _____ [1 pt]

b) Use delta, epsilon, and the limit definition to prove your answer from part (a). Your answer must include a conclusion statement. [4 pts]

7. For a certain function $h(x)$, I can find a solution for $h(x) = R$, where R is any arbitrarily large number, by plugging in an x-value that is sufficiently close to -7. This proves that (fill in the boxes): [2 pts]

$\lim_{\square \to \square} h(x) = \square$

8. Evaluate each limit, or state that the limit does not exist. [2 pts each]

a) $\lim_{x \to 1} \frac{x^2+5x-6}{x-1} =$

b) $\lim_{x \to 5} \frac{x-5}{x^4-5^4} =$

c) $\lim_{x \to 2} \frac{x-2}{|x-2|} =$

d) $\lim_{x \to 2} \frac{x^2-5x+4}{x^2-2x-8} =$

9. Find the derivative of each function using any method. [2 pts each]

a) $f(x) = 7x^3 - 5x^2 + 10$

b) $g(x) = 8x^{(2/3)} - 10\sqrt{x} + \frac{4}{x^5}$

c) $h(x) = e^7 + \pi^{-3}$

11. Consider the function $f(x) = \frac{3}{2}x^2 - 5x + 4$

a) Find the equation of the line tangent to f(x) at x = 3. [3 pts]

b) There are two lines tangent to f(x) that also pass through the point (4, 2). Find the slope of each of the lines. [4 pts]

12. Consider the function $y = x^3 - 2x^2$, whose graph is shown on the right. The "local minimum" point also shown on the graph. Use the Power Rule to find the x-coordinate of the local minimum. [3 pts]