

CALCULUS I/MATH 150

SHANNON GRACEY

EXAM 1/CHAPTERS 1, 2.1

- π 100 POINTS POSSIBLE
- π YOUR WORK MUST SUPPORT YOUR ANSWER FOR FULL CREDIT TO BE AWARDED
- π NO GRAPHING CALCULATOR IS PERMITTED
- π PROVIDE EXACT ANSWERS (NO DECIMALS PLEASE)

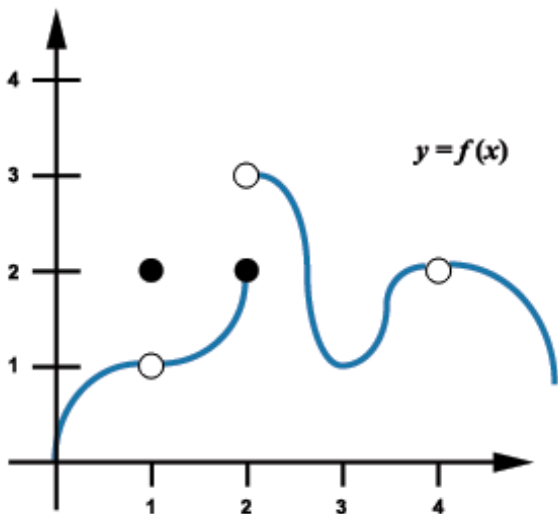


ONCE YOU BEGIN THE EXAM, YOU MAY NOT LEAVE THE PROCTORING CENTER UNTIL YOU ARE FINISHED. THIS MEANS NO BATHROOM BREAKS...

NAME _____

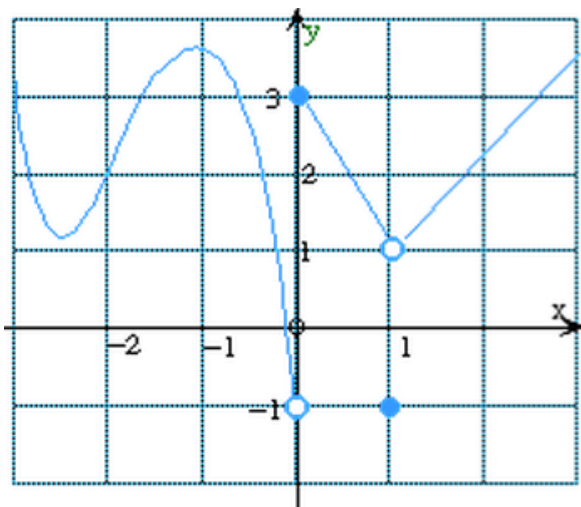
GOOD LUCK☺

1. (8 POINTS, 2 POINTS EACH) Use the graph of $y = f(x)$ shown below to find each limit, if it exists. **If the limit does not exist, explain why.**



- a. $\lim_{x \rightarrow 2} f(x) =$ _____
- b. $\lim_{x \rightarrow 1^-} f(x) =$ _____
- c. $\lim_{x \rightarrow 1^+} f(x) =$ _____
- d. $\lim_{x \rightarrow 1} f(x) =$ _____

2. (6 POINTS) Consider the function shown below. Is this function continuous at $x = 0$? EXPLAIN using the **3 conditions** for continuity at a point!



- 1.
 - 2.
 - 3.
- Circle one:
- continuous at $x = 1$ not continuous at $x = 1$

3. (6 POINTS) Find the limit L . Then find $\delta > 0$ such that $|f(x) - L| < 0.01$ whenever $0 < |x - c| < \delta$.

$$\lim_{x \rightarrow 10} (10 - 5x)$$

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4. (25 POINTS, 5 POINTS EACH) Find the exact **FINITE LIMIT** analytically. If there is no finite limit, write DNE (does not exist). DO NOT USE YOUR CALCULATOR!
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a. $\lim_{x \rightarrow \pi} (\sec^3(9x/4))$

d. $\lim_{x \rightarrow 1/3} \frac{3x - 1}{27x^3 - 1}$

b. $\lim_{x \rightarrow 4} \left(\frac{x^2 - x - 1}{x - 1} \right)$

c. $\lim_{x \rightarrow 0} \frac{1 - \cos 3x}{x}$

e. $\lim_{x \rightarrow -32} \left(-\sqrt[5]{x} + \sqrt[3]{2x} \right)$

5. (16 POINTS, 8 POINTS EACH) Find the exact **FINITE LIMIT** analytically. If there is no finite limit, write DNE (does not exist). DO NOT USE YOUR CALCULATOR!

a. $\lim_{x \rightarrow 2} \frac{\sqrt{x} - \sqrt{2}}{x - 2}$

b. $\lim_{\Delta x \rightarrow 0} \frac{\frac{1}{x + \Delta x} - \frac{1}{x}}{\Delta x}$

6. (10 POINTS) Use the limit definition to find the derivative of f with respect to x of $f(x) = \sin(x)$.

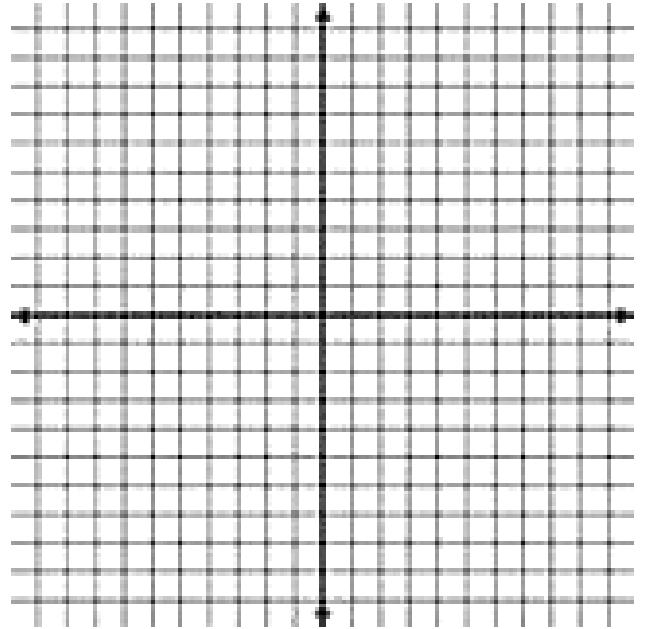
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7. (7 POINTS) Find the limit. It is acceptable to write a result of plus or minus infinity.

$$\lim_{x \rightarrow \pi/2^+} \sec x$$

8. (10 POINTS) Consider the function

$$f(x) = \begin{cases} x^2 - 15, & \text{if } x < 5 \\ -10, & \text{if } x = 5 \\ \sqrt{x-1}, & \text{if } x > 5 \end{cases}$$

a) (4 POINTS) Sketch the graph.



b) (3 POINTS) Identify the values of c , for which $\lim_{x \rightarrow c} f(x)$ exists. Use interval notation.

c) (3 POINTS) On what interval(s) is this function continuous? Use interval notation.

9. (12 POINTS, 3 POINTS EACH). Evaluate the limits below using the following information:

$$\lim_{x \rightarrow c} f(x) = \infty, \quad \lim_{x \rightarrow c} g(x) = \frac{1}{2}, \quad \text{and} \quad \lim_{x \rightarrow c} h(x) = 5$$

a. $\lim_{x \rightarrow c} \left[\frac{h(x)}{f(x)} \right]$

c. $\lim_{x \rightarrow c} \left(-g(x) + [h(x)]^2 \right)$

b. $\lim_{x \rightarrow c} [g(x)f(x)]$

d. $\cos^{-1} \left(\lim_{x \rightarrow c} g(x) \right)$