

Department of Mathematics – University of Tennessee
Math 131 Calculus 1A
Test 1

Name: _____

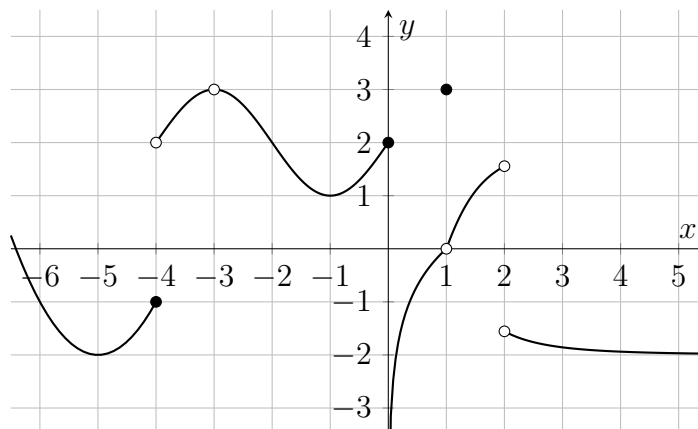
Time allowed: 50 minutes

Instructions:

- Calculators are not allowed.
- All electronic devices must be put away.
- Answers with insufficient or incorrect working will not receive full credit.
- Simplify answers whenever possible.

Page	Points	Score
2	10	
3	10	
4	10	
5	10	
6	10	
Total:	50	

1. Use the graph of $y = f(x)$ below to answer the following questions.



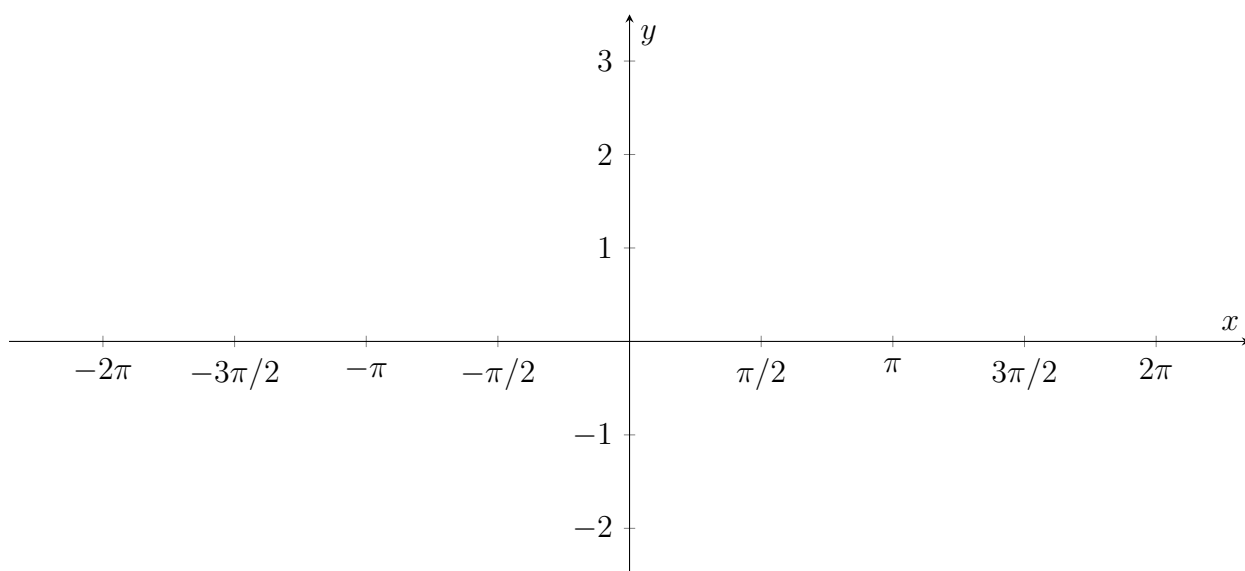
- (a) (1 point) Find $f(-4)$.
- (b) (1 point) Find $\lim_{x \rightarrow -4^+} f(x)$.
- (c) (1 point) Find $\lim_{x \rightarrow 0^-} f(x)$.
- (d) (1 point) Find $\lim_{x \rightarrow 0^+} f(x)$.
- (e) (1 point) Find $f(1)$.
- (f) (1 point) Find $\lim_{x \rightarrow 1} f(x)$.
- (g) (2 points) What is the equation of the vertical asymptote?
- (h) (2 points) Find all values b such that $\lim_{x \rightarrow b} f(x)$ exists but $f(b)$ is undefined.

2. Find the exact value of each expression below, or state that the expression is undefined.

(a) (2 points) $\sin \frac{\pi}{3}$

(b) (3 points) $\sec \frac{5\pi}{4}$

3. (5 points) Sketch a graph of $y = 1 + \cos x$ on the interval $[-2\pi, 2\pi]$. Clearly label the coordinates of the y -intercept.



4. Simplify each expression as much as possible.

(a) (2 points) $\tan x \cos x$

(b) (3 points) $(1 - \cos^2 t) \csc t$

5. Evaluate each limit or explain why the limit does not exist.

(a) (2 points) $\lim_{x \rightarrow 3^+} \frac{9}{x - 3}$

(b) (3 points) $\lim_{x \rightarrow 5} \frac{x^2 - 25}{x - 5}$

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6. (4 points) Evaluate $\lim_{x \rightarrow 1} \frac{x-1}{\sqrt{x}-1}$ or explain why the limit does not exist.
7. (2 points) Evaluate $\lim_{x \rightarrow 7} (f(x) + 3g(x))$ given that $\lim_{x \rightarrow 7} f(x) = -2$ and $\lim_{x \rightarrow 7} g(x) = 4$.
8. (4 points) Evaluate $\lim_{x \rightarrow 0} x^2 \cos \frac{1}{x}$. Name any theorems that you use, and show all limit calculations.

9. (5 points) Consider the piecewise function $f(x) = \begin{cases} x^3 - 5 & \text{if } x \leq 2, \\ \sqrt{1+x} & \text{if } x > 2. \end{cases}$

Find the value of $\lim_{x \rightarrow 2} f(x)$. Show all limit calculations. If the limit does not exist, explain why in 1-2 complete sentences.

10. (5 points) Sketch a graph of a function f that satisfies all of the following conditions.

- $f(-3) = 0$
- $\lim_{x \rightarrow -3^-} f(x) = 2$
- $\lim_{x \rightarrow -3^+} f(x) = -4$
- $\lim_{x \rightarrow 4} f(x) = \infty$

