

Math 131 - Quiz 4

September 17, 2025

Name key

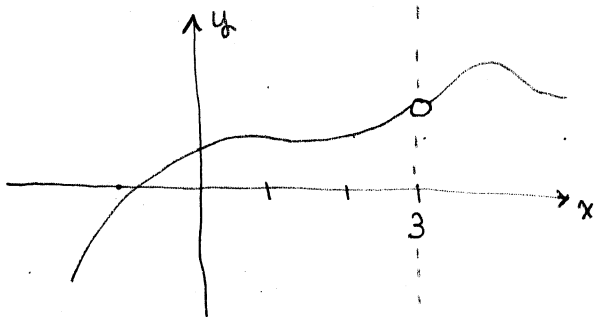
Score _____

Show all work to receive credit. Supply explanations where necessary.

1. (2 points) What does it mean for the function f to be continuous at $x = 1$?

IT MEANS $\lim_{x \rightarrow 1} f(x) = f(1)$.

2. (2.5 points) Sketch the graph of a function that has a limit at $x = 3$, but is not continuous at $x = 3$. Then say why your function is not continuous.



$\lim_{x \rightarrow 3} f(x)$ EXISTS,
BUT $f(3)$ IS NOT
DEFINED.

CANNOT HAVE
 $\lim_{x \rightarrow 3} f(x) = f(3)$.

3. (2.5 points) Discuss the continuity of $g(x) = \frac{4 \cos x + 9 \sin x}{x^2 - 9}$.

g IS CONTINUOUS

EVERYWHERE EXCEPT WHEN

$DENOM = 0$



g IS CONTINUOUS FOR ALL x
EXCEPT $x=3, x=-3$.

4. (3 points) Find the number k that makes f continuous everywhere. For full credit, you work must show how you are using limits and the definition of continuity.

$$f(x) = \begin{cases} x + 6 \cos(\pi x), & x \leq 2 \\ kx^2 - 2x + 5, & x > 2 \end{cases}$$

EACH PIECE IS CONTINUOUS
ON ITS ENTIRE DOMAIN,
WE NEED ONLY LOOK AT THE
"BOUNDARY" BETWEEN THE PIECES.

THAT IS, WE MUST MAKE
 f CONTINUOUS AT $x=2$.

$$\lim_{x \rightarrow 2} f(x) = f(2)$$

$$f(2) = 2 + 6 \cos(2\pi) = 8$$

$$\lim_{x \rightarrow 2^-} f(x) = 2 + 6 \cos(2\pi) = 8$$

$$\lim_{x \rightarrow 2^+} f(x) = 4k - 2(2) + 5 = 4k + 1$$

$$4k + 1 = 8$$



$$k = \frac{7}{4}$$

WITH $k = \frac{7}{4}$, WE HAVE

$$\lim_{x \rightarrow 2} f(x) = f(2) = 8$$