

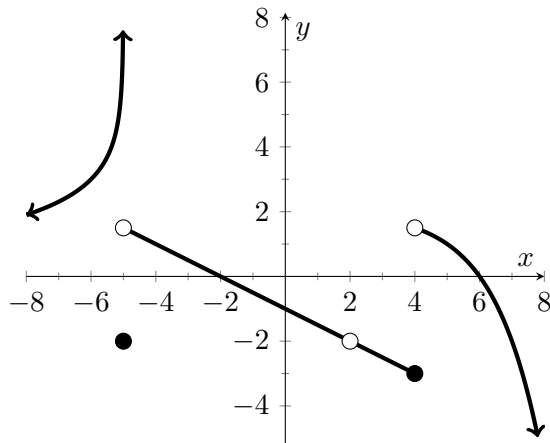
Math 251 Fall 2017

Quiz #3, September 20

Name: _____

There are 25 points possible on this quiz. This is a closed book quiz. Calculators and notes are not allowed. **Please show all of your work!** If you have any questions, please raise your hand.

Exercise 1. (5 pts.) Consider the function $f(x)$ with graph given below.



a.) List any values a where $\lim_{x \rightarrow a} f(x)$ fails to exist.

b.) List any values x where $f(x)$ fails to be continuous. Explain why the function is discontinuous at each such value a .

Exercise 2. (4 pts.) Evaluate $\lim_{x \rightarrow 5} \frac{5x - x^2}{x^2 - 6x + 5}$.

Exercise 3. (4 pts.) Evaluate $\lim_{x \rightarrow 1} \frac{\frac{1}{x^2} - 1}{x - 1}$.

Exercise 4. (5 pts.) Consider the function

$$f(x) = \begin{cases} x + 2 & x < 2 \\ 1 & x = 2 \\ \frac{16}{x^2} & x > 2 \end{cases}$$

a.) Evaluate $\lim_{x \rightarrow 2} f(x)$.

b.) Explain why $f(x)$ fails to be continuous at $x = 2$.

Exercise 5. (4 pts.) Using complete sentences, explain why the function $f(x) = 2 + x^3 + \sin x$ has a zero on the interval $[-\pi, \pi]$.

Exercise 6. (3 pts.) If $x^2 \leq g(x) \leq x^4 - x^2 + 1$ for all x , evaluate $\lim_{x \rightarrow 1} g(x)$. Justify your answer.