

Calculus 1 — Exam 1
MAT 250, Spring 2017 — D. Ivanšić

Name: _____
Show all your work!

1. (16pts) Use the graph of the function to answer the following. Justify your answer if a limit does not exist.

$$\lim_{x \rightarrow -3^+} f(x) =$$

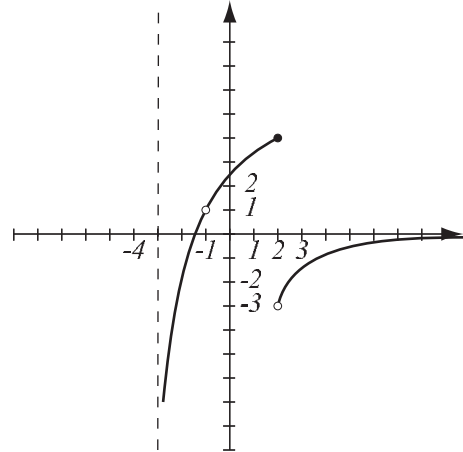
$$\lim_{x \rightarrow 2^-} f(x) =$$

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

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

$$\lim_{x \rightarrow -1} f(x) =$$

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



List points where f is not continuous and justify why it is not continuous at those points.

2. (6pts) Let $\lim_{x \rightarrow 3} f(x) = 2$ and $\lim_{x \rightarrow 3} g(x) = -1$. Use limit laws to find the limit below and show each step.

$$\lim_{x \rightarrow 3} \sqrt{x^3 f(x) - \frac{10}{g(x)}} =$$

3. (10pts) Find $\lim_{x \rightarrow 0} x^2 \cdot \sqrt{7 + \sin\left(\frac{1}{x}\right)}$. Use the theorem that rhymes with honey-producing insects.

Find the following limits algebraically. Do not use the calculator.

4. (5pts) $\lim_{x \rightarrow 5} \frac{x^2 - 5x}{x^2 - 3x - 10} =$

5. (7pts) $\lim_{x \rightarrow 2} \frac{3 - \sqrt{x + 7}}{x - 2} =$

6. (7pts) $\lim_{x \rightarrow 0} \frac{\tan(2x)}{x} =$

7. (7pts) $\lim_{x \rightarrow \infty} \frac{3x^2 - 5x + 4}{x^3 - 4x^2 + x - 7} =$

8. (6pts) $\lim_{x \rightarrow 2^+} \frac{x - 6}{4 - 2x} =$

11. (12pts) Consider the function defined below. Find a value for c that makes the function continuous.

$$f(x) = \begin{cases} x^2 + \frac{cx}{16}, & \text{if } x \leq 4 \\ \frac{cx - 4c}{x^2 - 16}, & \text{if } x > 4. \end{cases}$$

Bonus. (10pts) Find the limit algebraically.

$$\lim_{x \rightarrow \infty} (\sqrt{x^2 + 5x + 2} - x)$$