

YOUR NAME: _____

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Read each problem **very carefully** before starting to solve it. Each problem is worth 10 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. Graph the piece-wise defined function $f(x) = \begin{cases} -x^2 + 2, & \text{if } x < 1 \\ -x + 3, & \text{if } x \geq 1 \end{cases}$

2. Find the domains of the following functions:

(a) $f(x) = \frac{1}{x^4 + 3x^3 - 4x^2}$.

(b) $g(x) = \sqrt{5 - 2x}$.

3. Compute the following:

$$\lim_{x \rightarrow 7} \frac{\sqrt{3x - 12} - 3}{x - 7} =$$

4. Consider the piece-wise defined function $f(x) = \begin{cases} \frac{x^2 - 4x + 3}{x^2 - 6x + 5}, & \text{if } x < 1 \\ \frac{x + 1}{x + 3}, & \text{if } x \geq 1 \end{cases}$.

Find the following:

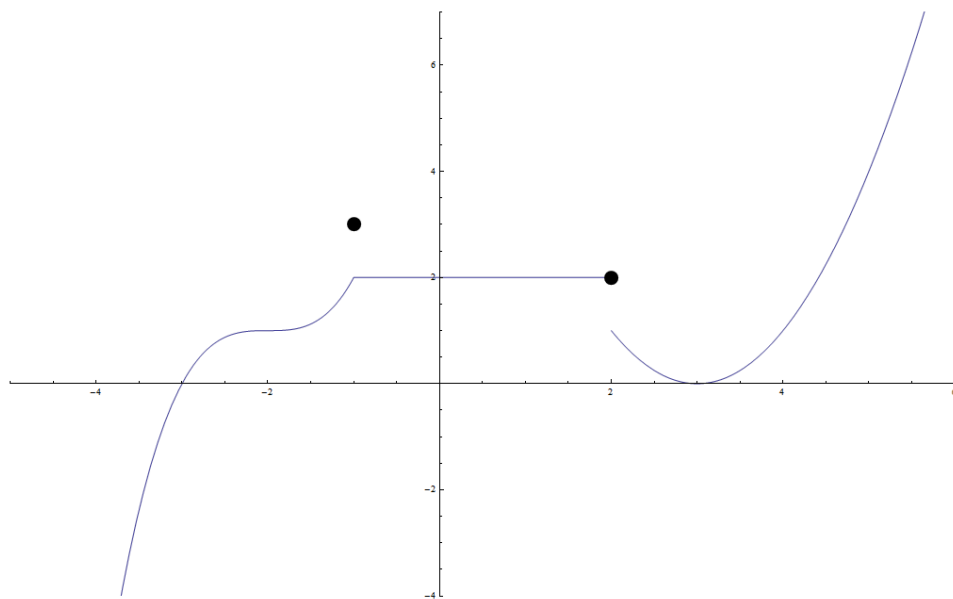
$$f(1) =$$

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

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

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

5. Consider the function $f(x)$, whose graph is shown below. Find the quantities requested in the first two lines below. Then circle the words that apply in the last two lines.



$$f(-1) = \quad , \quad \lim_{x \rightarrow -1^-} f(x) = \quad , \quad \lim_{x \rightarrow -1^+} f(x) = \quad , \quad \lim_{x \rightarrow -1} f(x) = \quad ,$$

$$f(2) = \quad , \quad \lim_{x \rightarrow 2^-} f(x) = \quad , \quad \lim_{x \rightarrow 2^+} f(x) = \quad , \quad \lim_{x \rightarrow 2} f(x) = \quad .$$

The function f at $x = -1$ is: left continuous right continuous continuous has limit

The function f at $x = 2$ is: left continuous right continuous continuous has limit