

Name: _____

Directions: Complete all questions and **show all applicable work**. Partial credit will be given. All questions are equally weighted.

1.) Draw a sketch of a function $f(x)$ that satisfies the following properties:

$$\begin{aligned}\lim_{x \rightarrow 0^-} f(x) &= 2, \\ \lim_{x \rightarrow 0^+} f(x) &= \infty, \\ \lim_{x \rightarrow \infty} f(x) &= \infty, \\ \lim_{x \rightarrow -\infty} f(x) &= -1,\end{aligned}$$

The function is left continuous at $x = 0$, and

$$f(3) = 5.$$

2.) Solve for x :

$$2 \log_3(x^2) - \log_3(x) = 9$$

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3.) First draw the graph of \sqrt{x} , then using simple transformations graph $g(x) = -1 + 4\sqrt{3-x}$. Be sure to state in words what each transformation does.

4.) Find the inverse of the following equation. Also, state the domain and range. This is the same function as the prior problem.

$$f(x) = -1 + 4\sqrt{3-x}$$

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5.) Compute the following limits:

$$\lim_{x \rightarrow 1} \ln(x)$$

$$\lim_{x \rightarrow 3} \frac{x - 1}{x^2 + 2x - 3}$$

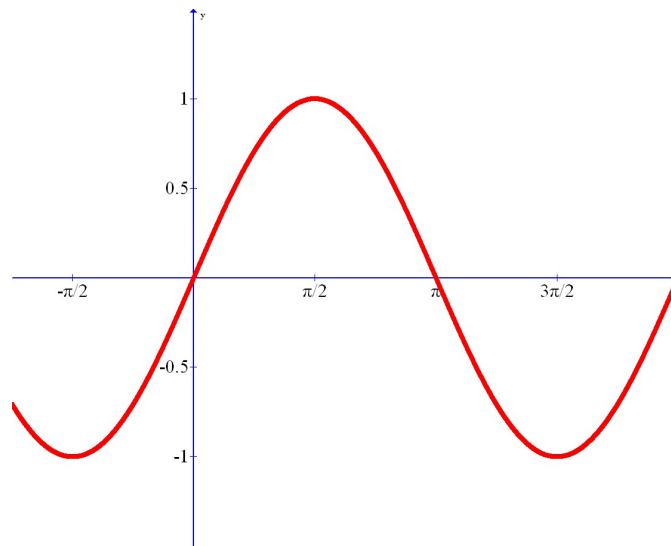
$$\lim_{x \rightarrow 0} \frac{\sqrt{x + 1} - 1}{x}$$

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6.) Use the definition of the derivative to compute $f'(x)$ given $f(x) = 2x - 3$.

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7.)



Using the graph above of $f(x)$, create a new axis and sketch $f'(x)$ for the domain $[0, 2\pi]$.

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8.) Let $x = t^2$ and $y = \sqrt{t}$, sketch a graph of this parametric curve for $0 \leq t \leq 5$. Indicate the direction of motion with an arrow.