This key should allow you to understand why you choose the option you did (beyond just getting a question right or wrong). More instructions on how to use this key can be found here.

If you have a suggestion to make the keys better, please fill out the short survey here.

Note: This key is auto-generated and may contain issues and/or errors. The keys are reviewed after each exam to ensure grading is done accurately. If there are issues (like duplicate options), they are noted in the offline gradebook. The keys are a work-in-progress to give students as many resources to improve as possible.

1. List 10 numbers you should use to estimate the one-sided limit of the function below as x approaches 2 from the right.

$$\frac{\frac{2}{x} - 1}{x - 2}$$

The solution is $\{2.1000, 2.0100, 2.0010, 2.0001\}$.

> **Plausible alternative answers include:** These values would estimate the limit of 2 on the left. These values would estimate the limit at the point and not a one-sided limit. If we get $\frac{0}{0}$ or $\frac{\infty}{\infty}$, the value 2 doesn't help us estimate the limit. If we get $\frac{0}{0}$ or $\frac{\infty}{\infty}$, the value 2 doesn't help us estimate the limit. This is correct!

General Comment: General Comments: To evaluate a one-sided limit, we want to put numbers close to the limit. We can't use the limit value itself if it results in $\frac{0}{0}$ or $\frac{\infty}{\infty}$

2. Evaluate the limit below, if possible.

$$\lim_{x \to 7} \frac{\sqrt{9x - 27} - 6}{6x - 42}$$

The solution is 0.125.

> **Plausible alternative answers include:** You likely tried to use a shortcut to find the limit of a function that only works for when the numerator/denominator are polynomials. You likely memorized how to solve the similar homework problem and used the same formula here. * This is the correct option. You likely believed that since the denominator is equal to 0, the limit is infinity. If you got a limit that does not match any of the above, please contact the coordinator.

General Comment: General comments: It is difficult to imagine the graph of this function, so you need to test values close to $x = 7$.

3. Based on the information below, what can be said about (a.) $f(0)$ and (b.) $f(x)$ when x is close to 0?

As x approaches 0, $f(x)$ approaches 12.547.

The solution is $f(x)$ is close to or exactly 12.547 when x is close to 0.

> **Plausible alternative answers include:**

General Comment: The limit tells you what happens as the x-values approach 0. It says **absolutely nothing** about what is happening exactly at $f(0)$!

4. For the graph below, find the value(s) a that makes the statement true: $\lim_{x \to a} f(x) = 0$.
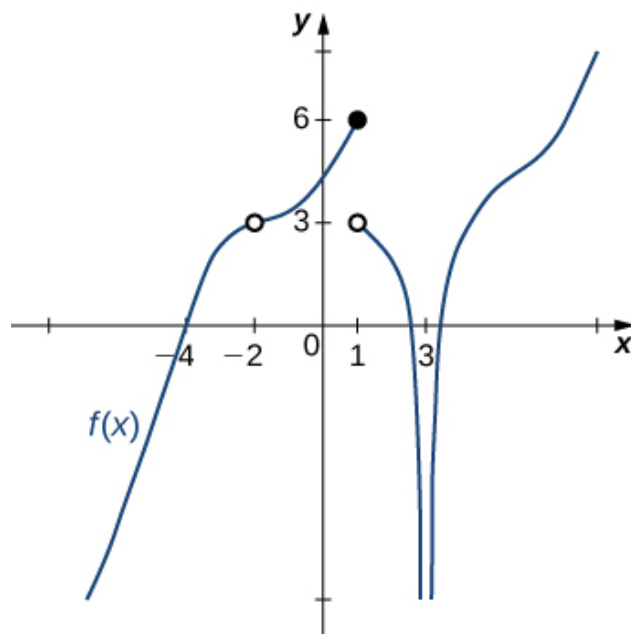
The solution is Multiple a make the statement true..

Plausible alternative answers include:

General Comment: General Comments: There can be multiple a values that make the statement true! For the limit, draw a horizontal line and determine if an x value makes the limit exist.

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5. List 10 numbers you should use to estimate the one-sided limit of the function below as x approaches 6 from the right.
$$\frac{\frac{6}{x} - 1}{x - 6}$$

The solution is $\{6.1000, 6.0100, 6.0010, 6.0001\}$.

Plausible alternative answers include: If we get $\frac{0}{0}$ or $\frac{\infty}{\infty}$, the value 6 doesn't help us estimate the limit. These values would estimate the limit at the point and not a one-sided limit. If we get $\frac{0}{0}$ or $\frac{\infty}{\infty}$, the value 6 doesn't help us estimate the limit. This is correct! These values would estimate the limit of 6 on the left.

General Comment: General Comments: To evaluate a one-sided limit, we want to put numbers close to the limit. We can't use the limit value itself if it results in $\frac{0}{0}$ or $\frac{\infty}{\infty}$

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6. Based on the information below, what can be said about (a.) $f(2)$ and (b.) $f(x)$ when x is close to 2?
$$f(x) \; approaches \; 10.975 \; as \; x \; approaches \; 2.$$

The solution is $f(x)$ is close to or exactly 10.975 when x is close to 2.

Plausible alternative answers include:

General Comment: The limit tells you what happens as the x-values approach 2. It says **absolutely nothing** about what is happening exactly at $f(2)$!

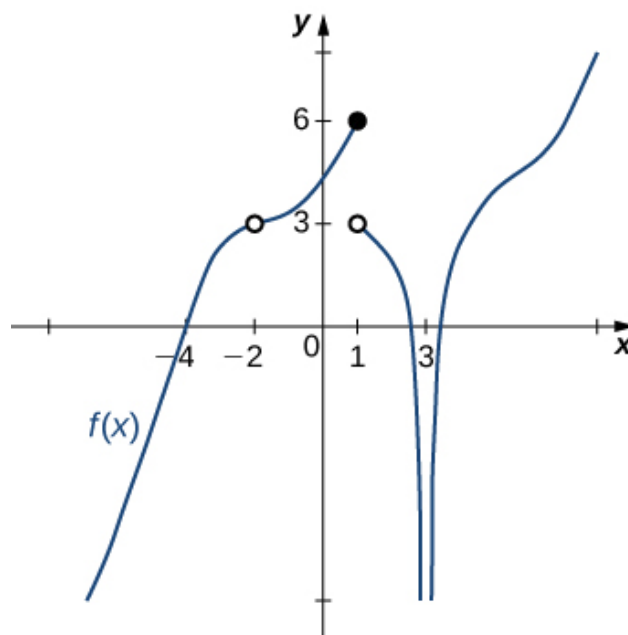7. Evaluate the one-sided limit of the function $f(x)$ below, if possible.

$$\lim_{x \to 1^-} \frac{1}{(x-1)^8} + 6$$

The solution is ∞.

Plausible alternative answers include:

General Comment: General comments: You should be able to graph the rational function displayed. If not, go back to Module 7 to learn about the general shape of rational functions.

8. For the graph below, find the value(s) a that makes the statement true: $\lim_{x \to a} f(x) = 0$.

The solution is Multiple a make the statement true..

Plausible alternative answers include:

General Comment: General Comments: There can be multiple a values that make the statement true! For the limit, draw a horizontal line and determine if an x value makes the limit exist.

9. Evaluate the limit below, if possible.

$$\lim_{x \to 7} \frac{\sqrt{4x - 12} - 4}{6x - 42}$$

The solution is 0.083.

Plausible alternative answers include: You likely learned L'Hospital's Rule in a previous course, but misapplied it here. You likely memorized how to solve the similar homework problem and used the same formula here. * This is the correct option. You likely believed that since the denominator is equal to 0, the limit is infinity. If you got a limit that does not match any of the above, please contact the coordinator.

General Comment: General comments: It is difficult to imagine the graph of this function, so you need to test values close to $x = 7$.

10. Evaluate the one-sided limit of the function $f(x)$ below, if possible.

$$\lim_{x \to -6+} \frac{3}{(x+6)^7} + 1$$

The solution is ∞.

   Plausible alternative answers include:

General Comment: General comments: You should be able to graph the rational function displayed. If not, go back to Module 7 to learn about the general shape of rational functions.