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. Evaluate the limit below, if possible.

$$\lim_{x \to 8} \frac{\sqrt{6x - 12} - 6}{3x - 24}$$

The solution is 0.167, which is option C.

A. 0.083

You likely memorized how to solve the similar homework problem and used the same formula here.

B. ∞

You likely believed that since the denominator is equal to 0, the limit is infinity.

C. 0.167

D. 0.028

You likely learned L'Hospital's Rule in a previous course, but misapplied it here.

E. None of the above

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 $x = 8$.

---

2. To estimate the one-sided limit of the function below as x approaches 5 from the right, which of the following sets of numbers should you use?

$$\frac{\frac{5}{x} - 1}{x - 5}$$

The solution is $\{5.1000, 5.0100, 5.0010, 5.0001\}$, which is option E.

A. $\{4.9000, 4.9900, 4.9990, 4.9999\}$

These values would estimate the limit of 5 on the left.

B. $\{4.9000, 4.9900, 5.0100, 5.1000\}$

These values would estimate the limit at the point and not a one-sided limit.

C. $\{5.0000, 5.1000, 5.0100, 5.0010\}$

If we get $\frac{0}{0}$ or $\frac{\infty}{\infty}$, the value 5 doesn't help us estimate the limit.

D. $\{5.0000, 4.9000, 4.9900, 4.9990\}$

If we get $\frac{0}{0}$ or $\frac{\infty}{\infty}$, the value 5 doesn't help us estimate the limit.

E. $\{5.1000, 5.0100, 5.0010, 5.0001\}$

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 $\frac{\infty}{\infty}$

---

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

$$\lim_{x \to 3^+} \frac{6}{(x-3)^3} + 8$$

The solution is ∞, which is option B.

A. $-\infty$

B. ∞

C. $f(3)$

D. The limit does not exist

E. None of the above

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.

---

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

$$\lim_{x \to -7^-} \frac{8}{(x-7)^7} + 2$$

The solution is $f(-7)$, which is option B.

A. $-\infty$

B. $f(-7)$

C. ∞

D. The limit does not exist

E. None of the above

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.

---

5. To estimate the one-sided limit of the function below as x approaches 5 from the left, which of the following sets of numbers should you use?

$$\frac{\frac{5}{x} - 1}{x - 5}$$

The solution is $\{4.9000, 4.9900, 4.9990, 4.9999\}$, which is option D.

A. $\{5.0000, 4.9000, 4.9900, 4.9990\}$

If we get $\frac{0}{0}$ or $\frac{\infty}{\infty}$, the value 5 doesn't help us estimate the limit.

B. $\{5.1000, 5.0100, 5.0010, 5.0001\}$

These values would estimate the limit of 5 on the right.

C. $\{4.9000, 4.9900, 5.0100, 5.1000\}$

These values would estimate the limit at the point and not a one-sided limit.

D. $\{4.9000, 4.9900, 4.9990, 4.9999\}$

This is correct!

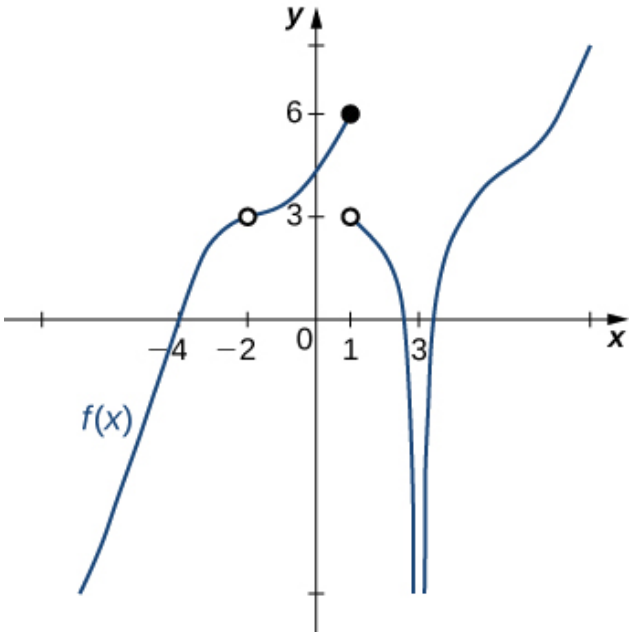
E. $\{5.0000, 5.1000, 5.0100, 5.0010\}$

If we get $\frac{0}{0}$ or $\frac{\infty}{\infty}$, the value 5 doesn't help us estimate the limit.

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 $\frac{\infty}{\infty}$

---

6. For the graph below, evaluate the limit: $\lim_{x \to 3} f(x)$.



The solution is $-\infty$, which is option B.

A. 1

B. $-\infty$

C. -2

D. The limit does not exist

E. None of the above

General Comment: General Comments: Remember that the limit does not exist if the left-hand and right-hand limits do not match.

---

7. Based on the information below, which of the following statements is always true?

$$As$$

x*approaches*∞, $f(x)$ approaches 13.506.

The solution is None of the above are always true., which is option E.

A. $f(x)$ is close to or exactly 13.506 when x is large enough.

B. $f(x)$ is close to or exactly ∞ when x is large enough.

C. $f(x)$ is undefined when $f(x)$ is large enough.

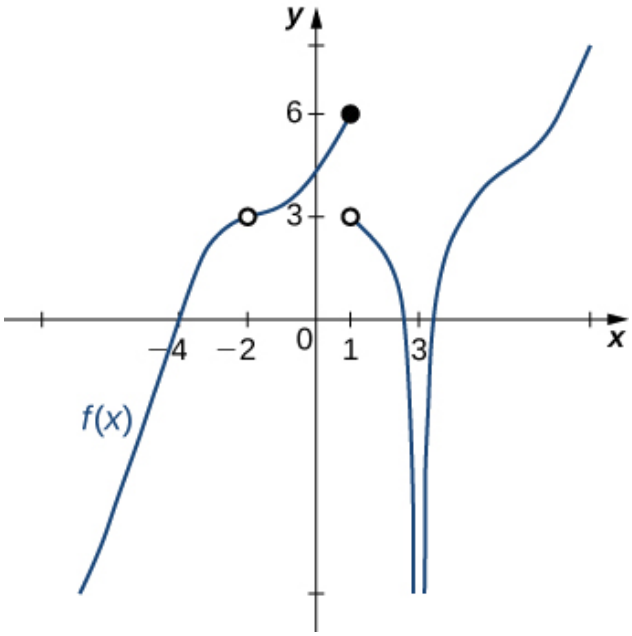
D. $f(x)$ is undefined when x is large enough.

E. None of the above are always true.

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

---

8. For the graph below, find the value(s) a that makes the statement true: $\lim_{x \to a} f(x)$ does not exist.



The solution is 1, which is option A.

A. 1

B. 3

C. -2

D. Multiple a make the statement true.

E. No a make the statement true.

General Comment: General Comments: Remember that the limit does not exist if the left-hand and right-hand limits do not match.

---

9. Evaluate the limit below, if possible.

$$\lim_{x \to 9} \frac{\sqrt{3x-2}-5}{9x-81}$$

The solution is None of the above, which is option E.

A. 0.011

You likely learned L'Hospital's Rule in a previous course, but misapplied it here.

B. ∞

You likely believed that since the denominator is equal to 0, the limit is infinity.

C. 0.192

You likely tried to use a shortcut to find the limit of a function that only works for when the numerator/denominator are polynomials.

D. 0.100

You likely memorized how to solve the similar homework problem and used the same formula here.

E. None of the above

* This is the correct option as the limit is 0.033.

General Comment: General comments: It is difficult to imagine the graph of this function, so you need to test values close to $x = 9$.

---

10. Based on the information below, which of the following statements is always true?

$$As$$

x$approaches$1,f(x)$approaches$7.878.

The solution is $f(x)$ is close to or exactly 7.878 when x is close to 1, which is option D.

A. $f(x) = 7.878$ when x is close to 1

B. $f(x)$ is close to or exactly 1 when x is close to 7.878

C. $f(x) = 1$ when x is close to 7.878

D. $f(x)$ is close to or exactly 7.878 when x is close to 1

E. None of the above are always true.

General Comment: General comments: The limit tells you what happens as the x-values approach 1. It says **absolutely nothing** about what is happening exactly at $f(x)$!
