

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. Multiply the following functions, then choose the domain of the resulting function from the list below.

$$f(x) = \sqrt{5x - 33} \text{ and } g(x) = 8x^3 + 4x^2 + 9x + 8$$

The solution is The domain is all Real numbers greater than or equal to $x = 6.6$.

- A. The domain is all Real numbers greater than or equal to $x = a$, where $a \in [-3, 9]$
- B. The domain is all Real numbers except $x = a$, where $a \in [-7, 2]$
- C. The domain is all Real numbers less than or equal to $x = a$, where $a \in [0, 11]$
- D. The domain is all Real numbers except $x = a$ and $x = b$, where $a \in [2, 9]$ and $b \in [-3, 6]$
- E. The domain is all Real numbers.

General Comment: General Comments: The new domain is the intersection of the previous domains.

2. Find the inverse of the function below. Then, evaluate the inverse at $x = 9$ and choose the interval that $f^{-1}(9)$ belongs to.

$$f(x) = e^{x-2} + 4$$

The solution is $f^{-1}(9) = 3.609$

- A. $f^{-1}(9) \in [3.53, 3.72]$

This is the solution.

- B. $f^{-1}(9) \in [6.43, 6.63]$

This solution corresponds to distractor 2.

- C. $f^{-1}(9) \in [-0.44, -0.35]$

This solution corresponds to distractor 1.

- D. $f^{-1}(9) \in [5.9, 6.01]$

This solution corresponds to distractor 4.

- E. $f^{-1}(9) \in [6.33, 6.53]$

This solution corresponds to distractor 3.

General Comment: Natural log and exponential functions always have an inverse. Once you switch the x and y , use the conversion $e^y = x \leftrightarrow y = \ln(x)$.

3. Find the inverse of the function below (if it exists). Then, evaluate the inverse at $x = 12$ and choose the interval the $f^{-1}(12)$ belongs to.

$$f(x) = \sqrt[3]{5x - 3}$$

The solution is 346.2

A. $f^{-1}(12) \in [-345.76, -344.27]$

This solution corresponds to distractor 3.

B. $f^{-1}(12) \in [346.12, 346.26]$

* This is the correct solution.

C. $f^{-1}(12) \in [-347.17, -345.73]$

This solution corresponds to distractor 2.

D. $f^{-1}(12) \in [344.5, 345.61]$

Distractor 1: This corresponds to

E. The function is not invertible for all Real numbers.

This solution corresponds to distractor 4.

General Comment: General Comments: Be sure you check that the function is 1-1 before trying to find the inverse!

4. Determine whether the function below is 1-1.

$$f(x) = (3x - 15)^3$$

The solution is yes

A. No, because the domain of the function is not $(-\infty, \infty)$.

Corresponds to believing 1-1 means the domain is all Real numbers.

B. No, because the range of the function is not $(-\infty, \infty)$.

Corresponds to believing 1-1 means the range is all Real numbers.

C. No, because there is a y -value that goes to 2 different x -values.

Corresponds to the Horizontal Line test, which this function passes.

D. No, because there is an x -value that goes to 2 different y -values.

Corresponds to the Vertical Line test, which checks if an expression is a function.

E. Yes, the function is 1-1.

* This is the solution.

General Comment: General Comments: There are only two valid options: The function is 1-1 OR No because there is a y -value that goes to 2 different x -values.

0. Choose the interval below that f composed with g at $x = -1$ is in.

$$f(x) = -3x^3 - 3x^2 + x \text{ and } g(x) = 3x^3 - 3x^2 - 3x$$

The solution is 51.0

A. $(f \circ g)(-1) \in [45, 52]$

* This is the correct solution

B. $(f \circ g)(-1) \in [53, 59]$

Distractor 2: Corresponds to being slightly off from the solution.

C. $(f \circ g)(-1) \in [-5, -2]$

Distractor 1: Corresponds to reversing the composition.

D. $(f \circ g)(-1) \in [-2, 5]$

Distractor 3: Corresponds to being slightly off from the solution.

E. It is not possible to compose the two functions.

General Comment: General Comments: f composed with g at x means $f(g(x))$. The order matters!
