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.

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

$$f(x) = 4x + 9 \text{ and } g(x) = \frac{3}{5x + 29}$$

The solution is The domain is all Real numbers except $x = -5.8$

A. The domain is all Real numbers greater than or equal to $x = a$, where $a \in [2, 7]$

B. The domain is all Real numbers except $x = a$, where $a \in [-8, -2]$

C. The domain is all Real numbers less than or equal to $x = a$, where $a \in [4, 12]$

D. The domain is all Real numbers except $x = a$ and $x = b$, where $a \in [-9, 0]$ and $b \in [-8, -5]$

E. The domain is all Real numbers.

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

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

$$f(x) = \sqrt{6x + 39}$$

The solution is yes

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

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

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

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

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

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

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 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.

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63. Find the inverse of the function below (if it exists). Then, evaluate the inverse at $x = -13$ and choose the interval the $f^{-1}(-13)$ belongs to.

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

The solution is -440.0

A. $f^{-1}(-13) \in [-439.27, -438.56]$

Distractor 1: This corresponds to

B. $f^{-1}(-13) \in [439.91, 440.19]$

This solution corresponds to distractor 2.

C. $f^{-1}(-13) \in [-440.91, -439.09]$

* This is the correct solution.

D. $f^{-1}(-13) \in [438.17, 439.04]$

This solution corresponds to distractor 3.

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

This solution corresponds to distractor 4.

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

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

$$f(x) = x^3 - 4x^2 - x \text{ and } g(x) = -2x^3 - 1x^2 + 3x$$

The solution is -22.0

A. $(f \circ g)(-1) \in [96, 104]$

Distractor 1: Corresponds to reversing the composition.

B. $(f \circ g)(-1) \in [-18, -5]$

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

C. $(f \circ g)(-1) \in [89, 95]$

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

D. $(f \circ g)(-1) \in [-31, -17]$

* This is the correct solution

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

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

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65. Find the inverse of the function below. Then, evaluate the inverse at $x = 7$ and choose the interval that $f^{-1}(7)$ belongs to.

$$f(x) = e^{x+3} + 3$$

The solution is $f^{-1}(7) = -1.614$

A. $f^{-1}(7) \in [4.9, 6]$

This solution corresponds to distractor 4.

B. $f^{-1}(7) \in [4.9, 6]$

This solution corresponds to distractor 2.

C. $f^{-1}(7) \in [-2.2, -1.4]$

This is the solution.

D. $f^{-1}(7) \in [3.1, 5.2]$

This solution corresponds to distractor 1.

E. $f^{-1}(7) \in [3.1, 5.2]$

This solution corresponds to distractor 3.

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