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. Determine whether the function below is 1-1.

$$f(x) = 24x^2 - 26x - 110$$

The solution is no

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 an x-value that goes to 2 different y-values.

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

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

* This is the solution.

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

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

E. Yes, the function is 1-1.

Corresponds to believing the function passes the Horizontal Line test.

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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62. Find the inverse of the function below. Then, evaluate the inverse at $x = 8$ and choose the interval that $f^{-1}(8)$ belongs to.

$$f(x) = e^{x+5} - 4$$

The solution is $f^{-1}(8) = -2.515$

A. $f^{-1}(8) \in [7.24, 7.7]$

This solution corresponds to distractor 1.

B. $f^{-1}(8) \in [-2.59, -2.17]$

This is the solution.

C. $f^{-1}(8) \in [-1.47, -1.36]$

This solution corresponds to distractor 4.

D. $f^{-1}(8) \in [-3.16, -2.79]$

This solution corresponds to distractor 3.

E. $f^{-1}(8) \in [-2.81, -2.57]$

This solution corresponds to distractor 2.

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

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

$$f(x) = \frac{1}{4x + 19} \text{ and } g(x) = \frac{5}{3x - 13}$$

The solution is The domain is all Real numbers except $x = -4.75$ and $x = 4.333333333333333$

A. The domain is all Real numbers greater than or equal to $x = a$, where $a \in [-9, 2]$

B. The domain is all Real numbers less than or equal to $x = a$, where $a \in [-5, 5]$

C. The domain is all Real numbers except $x = a$, where $a \in [3, 6]$

D. The domain is all Real numbers except $x = a$ and $x = b$, where $a \in [-8, -3]$ and $b \in [3, 12]$

E. The domain is all Real numbers.

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

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

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

The solution is -2.0

A. $(f \circ g)(-1) \in [-15.1, -13]$

Distractor 1: Corresponds to reversing the composition.

B. $(f \circ g)(-1) \in [-9.5, -4.2]$

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

C. $(f \circ g)(-1) \in [-4.3, -0.7]$

* This is the correct solution

D. $(f \circ g)(-1) \in [-22.4, -15.3]$

Distractor 3: Corresponds to being slightly off from the 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 (if it exists). Then, evaluate the inverse at $x = 14$ and choose the interval the $f^{-1}(14)$ belongs to.

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

The solution is 549.4

A. $f^{-1}(14) \in [549.26, 550.66]$

* This is the correct solution.

B. $f^{-1}(14) \in [547.94, 549.37]$

Distractor 1: This corresponds to

C. $f^{-1}(14) \in [-549.05, -546.33]$

This solution corresponds to distractor 3.

D. $f^{-1}(14) \in [-549.52, -548.91]$

This solution corresponds to distractor 2.

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!
