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

$$f(x) = e^{x+5} + 3$$

The solution is $f^{-1}(9) = -3.208$

A. $f^{-1}(9) \in [6.47, 6.96]$

This solution corresponds to distractor 1.

B. $f^{-1}(9) \in [5.45, 5.55]$

This solution corresponds to distractor 2.

C. $f^{-1}(9) \in [-3.54, -3.01]$

This is the solution.

D. $f^{-1}(9) \in [4.28, 4.77]$

This solution corresponds to distractor 3.

E. $f^{-1}(9) \in [5.59, 5.99]$

This solution corresponds to distractor 4.

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

$$f(x) = \frac{4}{4x + 23} \text{ and } g(x) = \frac{2}{3x + 11}$$

The solution is The domain is all Real numbers except $x = -5.75$ and $x = -3.66666666667$

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

B. The domain is all Real numbers less than or equal to $x = a,$ where $a \in [-8, 0]$

C. The domain is all Real numbers greater than or equal to $x = a,$ where $a \in [1, 7]$

D. The domain is all Real numbers except $x = a$ and $x = b,$ where $a \in [-7, -5]$ and $b \in [-4, 5]$

E. The domain is all Real numbers.

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

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63. Find the inverse of the function below (if it exists). Then, evaluate the inverse at $x = 10$ and choose the interval that $f^{-1}(10)$ belongs to.

$$f(x) = 5x^2 + 2$$

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

A. $f^{-1}(10) \in [1.41, 1.58]$

Distractor 2: This corresponds to finding the (nonexistent) inverse and not subtracting by the vertical shift.

B. $f^{-1}(10) \in [0.84, 1.45]$

Distractor 1: This corresponds to trying to find the inverse even though the function is not 1-1.

C. $f^{-1}(10) \in [5.08, 5.58]$

Distractor 4: This corresponds to both distractors 2 and 3.

D. $f^{-1}(10) \in [4.12, 4.6]$

Distractor 3: This corresponds to finding the (nonexistent) inverse and dividing by a negative.

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

* This is the correct option.

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.

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

The solution is 72.0

A. $(f \circ g)(1) \in [55, 69]$

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

B. $(f \circ g)(1) \in [15, 19]$

Distractor 1: Corresponds to reversing the composition.

C. $(f \circ g)(1) \in [3, 14]$

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

D. $(f \circ g)(1) \in [71, 76]$

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

$$f(x) = 36x^2 - 264x + 484$$

The solution is no

A. Yes, the function is 1-1.

Corresponds to believing the function passes the Horizontal Line test.

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

* This is the solution.

C. 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.

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

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

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

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

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.
