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.

$$f(x) = (3x + 18)^3$$

The solution is yes

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

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

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. Yes, the function is 1-1.

   * This is the solution.

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.

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

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

The solution is 36.0

A. $(f \circ g)(1) \in [58, 61]$

   Distractor 1: Corresponds to reversing the composition.

B. $(f \circ g)(1) \in [33, 38]$

   * This is the correct solution

C. $(f \circ g)(1) \in [27, 32]$

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

D. $(f \circ g)(1) \in [65, 75]$

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

$$f(x) = \ln(x - 4) - 2$$

The solution is $f^{-1}(9) = 59878.142$

A. $f^{-1}(9) \in [59865, 59875]$

This solution corresponds to distractor 3.

B. $f^{-1}(9) \in [442410, 442413]$

This solution corresponds to distractor 2.

C. $f^{-1}(9) \in [144, 150]$

This solution corresponds to distractor 4.

D. $f^{-1}(9) \in [59876, 59889]$

This is the solution.

E. $f^{-1}(9) \in [1095, 1101]$

This solution corresponds to distractor 1.

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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64. Find the inverse of the function below (if it exists). Then, evaluate the inverse at $x = 11$ and choose the interval that $f^{-1}(11)$ belongs to.

$$f(x) = 2x^2 - 4$$

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

A. $f^{-1}(11) \in [4.53, 5.21]$

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

B. $f^{-1}(11) \in [3.22, 3.77]$

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

C. $f^{-1}(11) \in [1.5, 1.96]$

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

D. $f^{-1}(11) \in [2.07, 3.59]$

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

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

$$f(x) = \frac{1}{5x - 19} \text{ and } g(x) = 5x^2 + 8x + 2$$

The solution is The domain is all Real numbers except $x = 3.8$

A. The domain is all Real numbers greater than or equal to $x = a,$ where $a \in [-8, -2]$

B. The domain is all Real numbers less than or equal to $x = a,$ where $a \in [-8, 1]$

C. The domain is all Real numbers except $x = a,$ where $a \in [0, 8]$

D. The domain is all Real numbers except $x = a$ and $x = b,$ where $a \in [4, 14]$ and $b \in [2, 12]$

E. The domain is all Real numbers.

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