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

$$f(x) = \sqrt{6x-29} \text{ and } g(x) = 4x^3 + x^2 + 3x + 6$$

The solution is The domain is all Real numbers greater than or equal to$x = 4.83333333333$.

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

B. The domain is all Real numbers except $x = a$, where $a \in [1, 5]$

C. The domain is all Real numbers greater than or equal to $x = a$, where $a \in [1, 15]$

D. The domain is all Real numbers except $x = a$ and $x = b$, where $a \in [-2, 8]$ and $b \in [-7, -1]$

E. The domain is all Real numbers.

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

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

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

The solution is -24.0

A. $(f \circ g)(-1) \in [-7, 0]$

Distractor 1: Corresponds to reversing the composition.

B. $(f \circ g)(-1) \in [-20, -11]$

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

C. $(f \circ g)(-1) \in [-14, -7]$

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

D. $(f \circ g)(-1) \in [-33, -23]$

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

$$f(x) = 18x^2 - 255x + 812$$

The solution is no

A. 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.

B. Yes, the function is 1-1.

Corresponds to believing the function passes the Horizontal Line test.

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

Corresponds to believing 1-1 means the range 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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64. Find the inverse of the function below (if it exists). Then, evaluate the inverse at $x = -10$ and choose the interval the $f^{-1}(-10)$ belongs to.

$$f(x) = \sqrt[3]{3x+2}$$

The solution is -334.0

A. $f^{-1}(-10) \in [331.76, 332.76]$

This solution corresponds to distractor 3.

B. $f^{-1}(-10) \in [-333.29, -332.31]$

Distractor 1: This corresponds to

C. $f^{-1}(-10) \in [333.87, 334.1]$

This solution corresponds to distractor 2.

D. $f^{-1}(-10) \in [-334.57, -333.73]$

* This is the correct solution.

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

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

The solution is $f^{-1}(9) = -2.435$

A. $f^{-1}(9) \in [-1.37, -1.35]$

This solution corresponds to distractor 4.

B. $f^{-1}(9) \in [7.49, 7.69]$

This solution corresponds to distractor 1.

C. $f^{-1}(9) \in [-2.41, -2.29]$

This solution corresponds to distractor 2.

D. $f^{-1}(9) \in [-2.66, -2.55]$

This solution corresponds to distractor 3.

E. $f^{-1}(9) \in [-2.55, -2.43]$

This is the solution.

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