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 (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. $f^{-1}(-10) \in [-332.71, -331.15]$

Distractor 1: This corresponds to

B. $f^{-1}(-10) \in [330.97, 332.89]$

This solution corresponds to distractor 3.

C. $f^{-1}(-10) \in [-335.14, -333.95]$

* This is the correct solution.

D. $f^{-1}(-10) \in [332.91, 334.36]$

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!

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

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

The solution is -24.0

A. $(f \circ g)(-1) \in [-2, 5]$

Distractor 1: Corresponds to reversing the composition.

B. $(f \circ g)(-1) \in [-33, -29]$

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

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

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

D. $(f \circ g)(-1) \in [-27, -21]$

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

$$f(x) = \frac{4}{4x - 13} \text{ and } g(x) = \frac{4}{3x - 20}$$

The solution is The domain is all Real numbers except $x = 3.25$ and $x = 6.666666666666667$

A. The domain is all Real numbers greater than or equal to $x = a$, where $a \in [-6, 1]$

B. The domain is all Real numbers except $x = a$, where $a \in [2, 7]$

C. The domain is all Real numbers less than or equal to $x = a$, where $a \in [-9, -3]$

D. The domain is all Real numbers except $x = a$ and $x = b$, where $a \in [1, 6]$ and $b \in [6, 11]$

E. The domain is all Real numbers.

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

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

$$f(x) = \ln(x - 5) - 4$$

The solution is $f^{-1}(9) = 442418.392$

A. $f^{-1}(9) \in [1202597, 1202601]$

This solution corresponds to distractor 2.

B. $f^{-1}(9) \in [152, 154]$

This solution corresponds to distractor 1.

C. $f^{-1}(9) \in [442406, 442412]$

This solution corresponds to distractor 3.

D. $f^{-1}(9) \in [442418, 442422]$

This is the solution.

E. $f^{-1}(9) \in [44, 55]$

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

$$f(x) = 15x^2 - 142x + 280$$

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

* This is the solution.

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.

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.
