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 $x = 5$ and choose the interval that $f^{-1}(5)$ belongs to.

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

The solution is $f^{-1}(5) = -2.307$

    A. $f^{-1}(5) \in [-4.8, -1.5]$

       This is the solution.

    B. $f^{-1}(5) \in [4.8, 8.5]$

       This solution corresponds to distractor 4.

    C. $f^{-1}(5) \in [4.8, 8.5]$

       This solution corresponds to distractor 2.

    D. $f^{-1}(5) \in [3.2, 4.6]$

       This solution corresponds to distractor 3.

    E. $f^{-1}(5) \in [3.2, 4.6]$

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

$$f(x) = \sqrt{-5x - 16}$$

The solution is yes

    A. Yes, the function is 1-1.

       * This is the solution.

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

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

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

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

The solution is -14.0

A. $(f \circ g)(1) \in [-14.8, -11.8]$

   * This is the correct solution

B. $(f \circ g)(1) \in [-11, -6.9]$

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

C. $(f \circ g)(1) \in [-4.4, -2]$

   Distractor 1: Corresponds to reversing the composition.

D. $(f \circ g)(1) \in [-7.5, -4.7]$

   Distractor 2: 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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64. Find the inverse of the function below (if it exists). Then, evaluate the inverse at $x = -12$ and choose the interval that $f^{-1}(-12)$ belongs to.
$$f(x) = 5x^2 + 3$$

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

A. $f^{-1}(-12) \in [0.44, 1.37]$

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

B. $f^{-1}(-12) \in [3.67, 4.05]$

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

C. $f^{-1}(-12) \in [1.57, 2]$

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

D. $f^{-1}(-12) \in [5.47, 5.84]$

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

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.

$$f(x) = 6x + 9 \text{ and } g(x) = \frac{2}{5x - 24}$$

The solution is The domain is all Real numbers except $x = 4.8$

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

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

C. The domain is all Real numbers less than or equal to $x = a$, where $a \in [-5, 0]$

D. The domain is all Real numbers except $x = a$ and $x = b$, where $a \in [-7, -3]$ and $b \in [-13, -2]$

E. The domain is all Real numbers.

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