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

$$f(x) = \sqrt{5x - 17}$$

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. Yes, the function is 1-1.

* This is the solution.

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

Corresponds to believing 1-1 means the range 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. No, because the domain of the function is not $(-\infty, \infty)$.

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

General Comment: 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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2. Choose the interval below that f composed with g at $x = 1$ is in.

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

The solution is 3.0

A. $(f \circ g)(1) \in [82, 88]$

Distractor 1: Corresponds to reversing the composition.

B. $(f \circ g)(1) \in [5, 13]$

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

C. $(f \circ g)(1) \in [0, 6]$

* This is the correct solution

D. $(f \circ g)(1) \in [90, 95]$

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

E. It is not possible to compose the two functions.

General Comment: General Comments: f composed with g at x means $f(g(x))$. The order matters!

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

$$f(x) = \frac{4}{4x + 29} \text{ and } g(x) = \frac{1}{4x + 25}$$

The solution is The domain is all Real numbers except $x = -7.25$ and $x = -6.25$

A. The domain is all Real numbers greater than or equal to $x = a$, where $a \in [4, 7]$

B. The domain is all Real numbers except $x = a$, where $a \in [5, 8]$

C. The domain is all Real numbers less than or equal to $x = a$, where $a \in [5, 8]$

D. The domain is all Real numbers except $x = a$ and $x = b$, where $a \in [-8, -2]$ and $b \in [-10, -4]$

E. The domain is all Real numbers.

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

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4. 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.

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

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

A. $f^{-1}(-12) \in [7.18, 8.3]$

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

B. $f^{-1}(-12) \in [2.36, 3.91]$

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

C. $f^{-1}(-12) \in [0.16, 2.13]$

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

D. $f^{-1}(-12) \in [5.49, 6.34]$

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 Comment: General Comments: Be sure you check that the function is 1-1 before trying to find the inverse!

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0. 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 $f^{-1}(9) = 153.413$

A. $f^{-1}(9) \in [442417, 442419]$

This solution corresponds to distractor 1.

B. $f^{-1}(9) \in [139, 146]$

This solution corresponds to distractor 3.

C. $f^{-1}(9) \in [1202605, 1202614]$

This solution corresponds to distractor 2.

D. $f^{-1}(9) \in [147, 158]$

This is the solution.

E. $f^{-1}(9) \in [58, 61]$

This solution corresponds to distractor 4.

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