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.

---

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

$$f(x) = \frac{4}{5x + 18} \text{ and } g(x) = 3x^3 + 8x^2 + 3$$

The solution is The domain is all Real numbers except $x = -3.6$

A. The domain is all Real numbers except $x = a,$ where $a \in [-5, 0]$

B. The domain is all Real numbers less than or equal to $x = a,$ where $a \in [-2, 7]$

C. The domain is all Real numbers greater than or equal to $x = a,$ where $a \in [2, 11]$

D. The domain is all Real numbers except $x = a$ and $x = b,$ where $a \in [-9, -5]$ and $b \in [4, 8]$

E. The domain is all Real numbers.

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

---

62. Find the inverse of the function below. Then, evaluate the inverse at $x = 7$ and choose the interval that $f^{-1}(7)$ belongs to.

$$f(x) = \ln(x + 4) - 3$$

The solution is $f^{-1}(7) = 22022.466$

A. $f^{-1}(7) \in [14, 20]$

This solution corresponds to distractor 2.

B. $f^{-1}(7) \in [22017, 22026]$

This is the solution.

C. $f^{-1}(7) \in [22024, 22031]$

This solution corresponds to distractor 3.

D. $f^{-1}(7) \in [59869, 59873]$

This solution corresponds to distractor 4.

E. $f^{-1}(7) \in [45, 58]$

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 $e^y = x \leftrightarrow y = \ln(x)$.

---

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

$$f(x) = -25x^2 + 155x - 198$$

The solution is no

A. Yes, the function is 1-1.

Corresponds to believing the function passes the Horizontal Line test.

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. 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.

---

64. Choose the interval below that f composed with g at $x = -2$ is in.

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

The solution is -68.0

A. $(f \circ g)(-2) \in [-15, -10]$

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

B. $(f \circ g)(-2) \in [-72, -65]$

* This is the correct solution

C. $(f \circ g)(-2) \in [-8, 1]$

Distractor 1: Corresponds to reversing the composition.

D. $(f \circ g)(-2) \in [-67, -61]$

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!

---

65. Find the inverse of the function below (if it exists). Then, evaluate the inverse at $x = -13$ and choose the interval the $f^{-1}(-13)$ belongs to.

$$f(x) = \sqrt[3]{5x - 2}$$

The solution is -439.0

A. $f^{-1}(-13) \in [-439.75, -437.86]$

* This is the correct solution.

B. $f^{-1}(-13) \in [439.68, 439.95]$

This solution corresponds to distractor 3.

C. $f^{-1}(-13) \in [-439.93, -439.77]$

Distractor 1: This corresponds to

D. $f^{-1}(-13) \in [438.89, 439.12]$

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!
