

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.

1. Evaluate f composed with g at $x = 1$.

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

The solution is -60.0 .

Plausible alternative answers include: Distractor 3: Corresponds to being slightly off from the solution. Distractor 2: Corresponds to being slightly off from the solution. * This is the correct solution Distractor 1: Corresponds to reversing the composition.

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

2. Find the inverse of the function below (if it exists). If the inverse exists, evaluate the inverse at $x = 12.0$

$$f(x) = 3x^2 + 5$$

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

Plausible alternative answers include: Distractor 3: This corresponds to finding the (nonexistent) inverse and dividing by a negative. Distractor 4: This corresponds to both distractors 2 and 3. Distractor 2: This corresponds to finding the (nonexistent) inverse and not subtracting by the vertical shift. Distractor 1: This corresponds to trying to find the inverse even though the function is not 1-1. * This is the correct option.

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

3. Find the inverse of the function below (if it exists). If the inverse exists, evaluate the inverse at $x = 6$.

$$f(x) = \ln(x + 3) - 2$$

The solution is $f^{-1}(6) = 2977.958$.

Plausible alternative answers include: This solution corresponds to distractor 1. This is the solution. This solution corresponds to distractor 2. This solution corresponds to distractor 3. 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 $e^y = x \leftrightarrow y = \ln(x)$.

4. Determine whether the function below is 1-1. Provide reasoning for your response.

$$f(x) = -15x^2 - 148x - 357$$

The solution is no.

Plausible alternative answers include:Corresponds to believing the function passes the Horizontal Line test. Corresponds to the Vertical Line test, which checks if an expression is a function.

Corresponds to believing 1-1 means the range is all Real numbers. * This is the solution. Corresponds to believing 1-1 means the domain is all Real numbers.

General Comment: 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.

5. Multiply the following functions and write the domain of the resulting function.

$$f(x) = \frac{4}{3x - 10} \text{ and } g(x) = \frac{1}{3x - 10}$$

The solution is The domain is all Real numbers except $x = 3.33$ and $x = 3.33$.

Plausible alternative answers include:

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

6. Find the inverse of the function below (if it exists). If the inverse exists, evaluate the inverse at $x = 14.0$

$$f(x) = \sqrt[3]{4x - 2}$$

The solution is 686.5.

Plausible alternative answers include: Distractor 1: This corresponds to This solution corresponds to distractor 3. * This is the correct solution. This solution corresponds to distractor 2. This solution corresponds to distractor 4.

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

7. Find the inverse of the function below (if it exists). If the inverse exists, evaluate the inverse at $x = 8$.

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

The solution is $f^{-1}(8) = -2.901$.

Plausible alternative answers include: This solution corresponds to distractor 2. This solution corresponds to distractor 3. This is the solution. This solution corresponds to distractor 4. This solution corresponds to distractor 1.

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

8. Add the following functions and write the domain of the resulting function.

$$f(x) = \frac{1}{5x + 16} \text{ and } g(x) = 7x^3 + 8x^2 + 6x + 9$$

The solution is The domain is all Real numbers except $x = -3.2$.

Plausible alternative answers include:

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

9. Determine whether the function below is 1-1. Provide reasoning for your response.

$$f(x) = -20x^2 - 151x - 285$$

The solution is no.

Plausible alternative answers include: Corresponds to believing the function passes the Horizontal Line test. Corresponds to believing 1-1 means the range is all Real numbers. Corresponds to the Vertical Line test, which checks if an expression is a function. Corresponds to believing 1-1 means the domain is all Real numbers. * This is the solution.

General Comment: 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.

10. Evaluate f composed with g at $x = -1$.

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

The solution is -5.0 .

Plausible alternative answers include: Distractor 3: Corresponds to being slightly off from the solution. Distractor 2: Corresponds to being slightly off from the solution. Distractor 1: Corresponds to reversing the composition. * This is the correct solution

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