This is the Answer Key for Module 8 Version MU.

36. Which of the following intervals describes the Domain of the function below?

$$f(x) = -\log_2(x+3) + 5$$

The solution is $(-3, \infty)$

A. $(a, \infty), a \in [-4.22, -1.46]$

   * This is the solution.

B. $[a, \infty), a \in [-5.89, -4.56]$

   Distractor 3: This corresponds to using the negative vertical shift AND including the endpoint.

C. $(-\infty, a), a \in [2.14, 3.83]$

   Distractor 2: This corresponds to using negative of the horizontal shift. Remember: the general for is a*log(x-h)+k.

D. $(-\infty, a], a \in [4.48, 6.12]$

   Distractor 1: This corresponds to using the vertical shift when shifting the Domain AND including the endpoint.

E. $(-\infty, \infty)$

   Distractor 4: This corresponds to thinking of the Range of the log function (or the domain of the exponential function).

General Comments: The domain of a basic logarithmic function is $(0, \infty)$ and the Range is $(-\infty, \infty)$. We can use shifts when finding the Domain, but the Range will always be all Real numbers.

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37. Which of the following intervals describes the Domain of the function below?

$$f(x) = -e^{x-5} - 3$$

The solution is $(-\infty, \infty)$

A. $(-\infty, a), a \in [-6, -2]$

   Distractor 3: This corresponds to using the correct vertical shift *if we wanted the Range* AND including the endpoint.

B. $(a, \infty), a \in [0, 4]$

   Distractor 2: This corresponds to using the negative vertical shift AND flipping the Range interval.

C. $(-\infty, a], a \in [-6, -2]$

   Distractor 4: This corresponds to using the correct vertical shift *if we wanted the Range*.

D. $[a, \infty), a \in [0, 4]$

   Distractor 1: This corresponds to using the negative vertical shift AND flipping the Range interval AND including the endpoint.

E. $(-\infty, \infty)$

   * This is the solution.

General Comments: Domain of a basic exponential function is $(-\infty, \infty)$ while the Range is $(0, \infty)$. We can shift these intervals [and even flip when $a < 0$!] to find the new Domain/Range.

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38. Solve the equation for x and choose the interval that contains the solution (if it exists).

$$\log_5(-4x+7)+4=3$$

The solution is $x=1.7$

A. $x \in [1.91, 2.49]$

Corresponds to reversing the base and exponent when converting.

B. $x \in [-29.73, -29.05]$

Corresponds to ignoring the vertical shift when converting to exponential form.

C. $x \in [-2.02, -0.88]$

Corresponds to reversing the base and exponent when converting and reversing the value with x.

D. $x \in [0.79, 1.76]$

* This is the solution!

E. There is no Real solution to the equation.

Corresponds to believing a negative coefficient within the log equation means there is no Real solution.

General Comments: First, get the equation in the form $\log_b(cx+d)=a$. Then, convert to $b^a=cx+d$ and solve.

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39. Solve the equation for x and choose the interval that contains x (if it exists).

$$7=\ln\sqrt{\frac{25}{e^x}}$$

The solution is $x=-10.781000$

A. $x \in [-6, -5]$

Distractor 2: This corresponds to leaving 1/2 in front of the log.

B. $x \in [2, 8]$

Distractor 3: This corresponds to leaving 1/2 in front of the log AND getting the negative of the solution.

C. $x \in [-14, -9]$

* This is the real solution

D. $x \in [10, 13]$

Distractor 1: This corresponds to getting the negative of the solution.

E. There is no solution to the equation.

This corresponds to believing the exponential functional cannot be solved.

General comments: After using the properties of logarithmic functions to break up the right-hand side, use $\ln(e)=1$ to reduce the question to a linear function to solve. You can put $\ln(25)$ into a calculator if you are having trouble.

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40. Solve the equation for x and choose the interval that contains the solution (if it exists).

$$5^{3x+3}=16^{2x+5}$$

The solution is $x=-12.603$

A. $x \in [0.2, 1.28]$

   Correponds to ignoring that the bases are different.

B. $x \in [-2.5, -1.56]$

   Corresponds to ignoring that the basses are different and reversing that solution.

C. $x \in [-0.46, 0.43]$

   Corresponds to getting the negative of the actual solution.

D. $x \in [-12.79, -12.25]$

   * This is the solution!

E. There is no Real solution to the equation.

   Corresponds to believing there is no solution since the bases are not powers of each other.

General Comments: This question was written so that the bases could not be written the same. You will need to take the log of both sides.