

Solving Exponential Equations (2.13) Homework

The front of this homework is meant to be done without the use of a calculator. Determine the exact value of any expression that can be determined without a calculator. For example, write 3 rather than $\log_2 8$. For any expression that would require the use of a calculator, you may leave your answer in terms of logs. For example, your final answer may contain the term $\ln\left(\frac{3}{2}\right)$.

For questions #1-6, solve.

1. $2^{3x-1} = 8^{4x}$

4. $(4^{x-2})(8^{3x}) = \left(\frac{1}{2}\right)^{x-1}$

2. $e^{x+1} = 5$

5. $3(9)^x - 10(3)^x = -3$

3. $2^{3x} - 5 = 10$

6. $\frac{10^{x+5}}{\sqrt{10^x}} = 1000$

7. Let $f(x) = 2(3)^{x+4}$. Find $f^{-1}(x)$.

8. Let $g(x) = -2^x + 7$. Find $g^{-1}(x)$.

9. Let $h(x) = 5^{2x} - 10$. Find $h^{-1}(x)$.

10. Let $f(x) = 3\left(\frac{1}{4}\right)^{x+2} - 6$. Let $g(x) = f^{-1}(x)$.

a. Find $g(8)$.

b. For what input value is -3 the output of f ?

c. For what input value is -4 the output of g ?

11. Let $f(x) = 8(10)^{3x-2} + 7$. Let $g(x) = f^{-1}(x)$.

a. For the function f , find the input value corresponding with an output value of 100.

b. For the function g , find the input value corresponding with an output value of 2.

c. Find $g(27)$.

12. Let $f(x) = 2^x$ and let $g(x) = 4^{-x+3}$. Find the x -coordinate of the point of intersection of the graphs of f and g in the xy plane.

You may use a calculator/Desmos to answer the following questions. As is expected in AP Precalculus (unless otherwise specified by an individual question on the exam), round each answer to three decimal places.

13. Solve: $2^{3x-1} = 10$

14. Solve: $2^{3x-1} = 3^x$

15. Solve $e^{3x} + 2 = 11$

16. The function f is given by $f(x) = -18e^{kx}$, where k is a constant. If $f(1) = -38$, find $f(2)$.

17. The function g is given by $g(x) = 2 + 3^{2x+k}$, where k is a constant. If $g(-1) = 4$, find $g(1)$.

18. Janice deposits \$500 in a bank account that earns interest. With the rate at which interest accrues in the bank account, the amount of money increases by 5% every year. After how many years will Janice have \$800 in the account?

Your quiz next class will have two questions modeled off the type of questions linked to with the QR code to the right. This is the same QR code that was linked to on the first homework of this unit. Every time you refresh the page, it is new questions, so you have an infinite supply of questions to prepare you.



Solving Exponential Equations HW Answers

1. $x = -\frac{1}{9}$
2. $x = -1 + \ln 5$
3. $x = \frac{1}{3}\log_2 15$
4. $x = \frac{5}{12}$
5. $x = -1$ or $x = 1$
6. $x = -4$
7. $f^{-1}(x) = \log_3\left(\frac{x}{2}\right) - 4$
8. $g^{-1}(x) = \log_2(-x + 7)$
9. $h^{-1}(x) = \frac{1}{2}\log_5(x + 10)$
10.
 - a. $\log_{\left(\frac{1}{4}\right)}\left(\frac{14}{3}\right) - 2$ is correct, though a fraction in the base of a log feels clunky.
 $-\log_4\left(\frac{14}{3}\right) - 2$ is also correct and feels less clunky. But either is fine.
 - b. -2
 - c. 42
11.
 - a. $\frac{1}{3}\log\left(\frac{93}{8}\right) + \frac{2}{3}$
 - b. 80007
 - c. $\frac{1}{3}\log\left(\frac{5}{2}\right) + \frac{2}{3}$
12. $x = 2$
13. 1.441
14. 0.707
15. 0.732
16. $f(2) = -80.222$ ($k = 0.747214$)
17. $f(1) = 164$ ($k = 2.63093$)
18. 9.633 years