

# MATH 150 - WEEK-IN-REVIEW 7

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## PROBLEM STATEMENTS

1. Solve each of the following for  $x$ . **Always check for extraneous solutions.**

(a)  $e^x = \frac{5}{2}$

(b)  $3^x + 7 = 15$  using the common logarithm

(c)  $\frac{15}{100 + e^{2x}} = 3$

(d)  $e^{2x} + 7e^x - 18 = 0$

(e)  $3^{x^2-1} = 27$

2. The number of bacteria  $y$  in a culture after  $t$  days is given by the function  $y(t) = 100e^{t/8}$ .

(a) What is the initial number of bacteria in the culture?

(b) How many bacteria are there after 40 days?

(c) After how many days will there be 4,000 bacteria?

3. Simplify each of the following without a calculator:

(a)  $7^{\log_7(4)} + 2$

(b)  $\log(10^{-5})$

(c)  $\log_{11}(3x + 5) = \log_{11}(9)$

4. Change  $\log_7(45)$  to base 5.

5. Change  $\log_6(x)$  to base 10

6. Use the properties of logarithms to expand the expression as a sum, difference, and/or constant multiple of logarithms. (Assume all variables are positive.)

(a)  $\log_4(64x^2)$

(b)  $\ln \sqrt[3]{\frac{x^2}{x^2 - 8x - 20}}$

7. Use the properties of logarithms to condense the expression as a single logarithm. (Assume all variables are positive.)

(a)  $2\log_5(x - 1) + 4\log_5(y) - 1$

(b)  $2\ln(6) - \ln(8) - \ln(81)$

8. Describe the transformation(s) of the graph of  $f(x) = e^x$  that yield(s) the graph of  $g(x) = -e^{2x-1} + 2$ .

Transformations:

Domain:

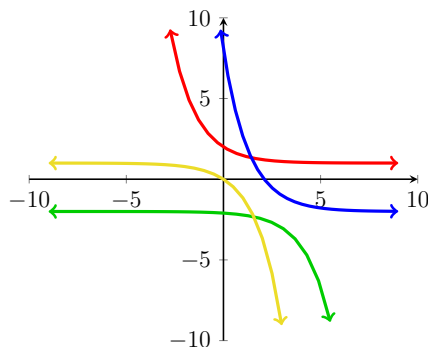
$x$ -intercept(s):

$y$ -intercept:

Horizontal Asymptote:

9. Describe the transformation(s) of the graph of  $f(x) = 3^x$  that yield(s) the graph of  $g(x) = 3^{-0.7x} + 1$ , then choose the graph that matches the function.

Transformations:



Domain:

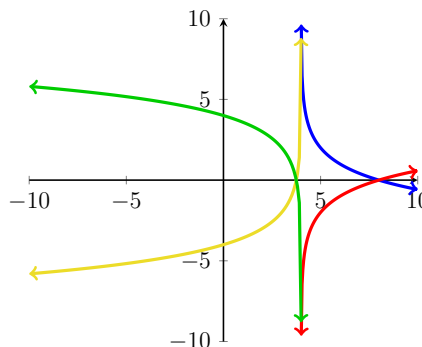
$x$ -intercept(s):

$y$ -intercept(s):

Horizontal Asymptote(s):

10. Describe the transformations of  $f(x) = \log_2(x)$  that yield  $g(x) = -\log_2(x - 4) + 2$ . Then state the domain,  $x$ -intercept, and vertical asymptote of the logarithmic function  $f(x)$ , then choose the graph that matches the function.

Transformations:



Domain:

$x$ -intercept(s):

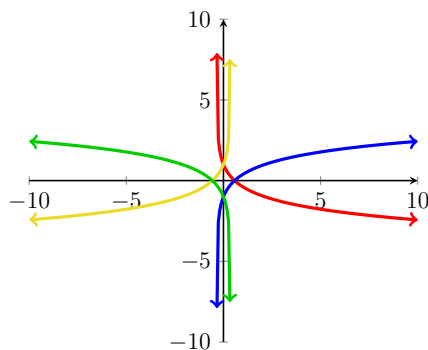
$y$ -intercept(s):

Vertical Asymptote(s):



11. Describe the transformations of  $f(x) = \ln(x)$  that yield  $g(x) = \ln(3x + 1) - 1$ . Then state the domain,  $x$ -intercept, and vertical asymptote of the logarithmic function  $g(x)$ , then choose the graph that matches the function.

Transformations:



Domain:

$x$ -intercept(s):

$y$ -intercept(s):

Vertical Asymptote(s):