

# MATH 150 - WEEK-IN-REVIEW 8

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## PROBLEM STATEMENTS

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

(a)  $\log_5(4y) = 3$

(b)  $\log_9(x + 2) = \log_{27}(6)$

(c)  $\log_5(x) + \log_5(x + 4) = 1$

2. find domain of the function  $f(x) = \frac{\sqrt{5-x} + e^{3x}}{\log_3(x+2)}$

3. If an investment of \$2000 grows to \$2500 after 3 years with an annual interest rate of 4%, compounded annually, find the time it takes for an investment of \$2000 to grow to \$3000.
4. If you invest \$2000 in an account with an annual interest rate of 4%, compounded continuously, how much money will you have after 8 years?



5. If the amount of a radioactive substance decreases to one-third of its initial amount in 20 years, find the half-life of the substance.

6. The number of bacteria  $y$  in a culture after  $t$  days is given by the function  $y(t) = 100e^{t/8}$ . After how many days will there be 4,000 bacteria?

7. A cup of coffee cools from  $80^{\circ}\text{C}$  to  $70^{\circ}\text{C}$  in 5 minutes. If the room temperature is  $25^{\circ}\text{C}$ , what will be the temperature of the coffee after 15 minutes?

8. A population of rabbits can be modeled using the logistic equation

$$N(t) = \frac{1000}{1 + 524e^{-0.18t}}$$

How long does it take for population of rabbits to grow to 4200?

9. Perform the operation  $\frac{x^2 + 5x - 14}{x^2 + 8x + 7} \div \frac{x^2 - x - 2}{x - 3}$  and simplify.

10. For the function  $g(x) = \sqrt{6 - 2x}$  compute and simplify the difference quotient.

11. For the following function  $g(x) = \frac{8x^2 - 10x + 3}{x - 1}$  find Vertical, Horizontal and Slant asymptote(s).



12.  $f(x) = \frac{2x^2 - 7x + 3}{x^2 - 2x - 3}$

Domain: \_\_\_\_\_

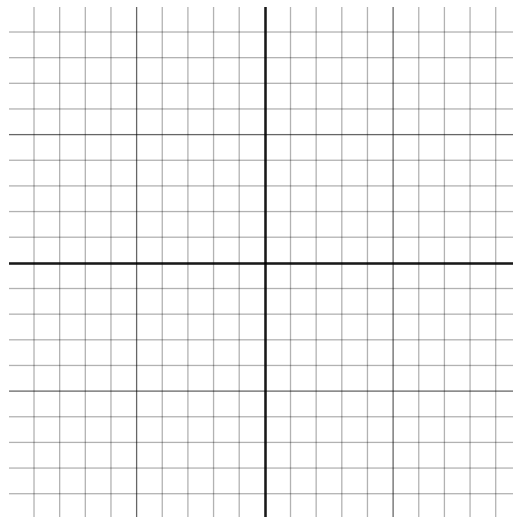
Hole(s): \_\_\_\_\_

Vertical Asymptote(s): \_\_\_\_\_

$y$ -intercept: \_\_\_\_\_

$x$ -intercept(s): \_\_\_\_\_

Horizontal Asymptote(s): \_\_\_\_\_





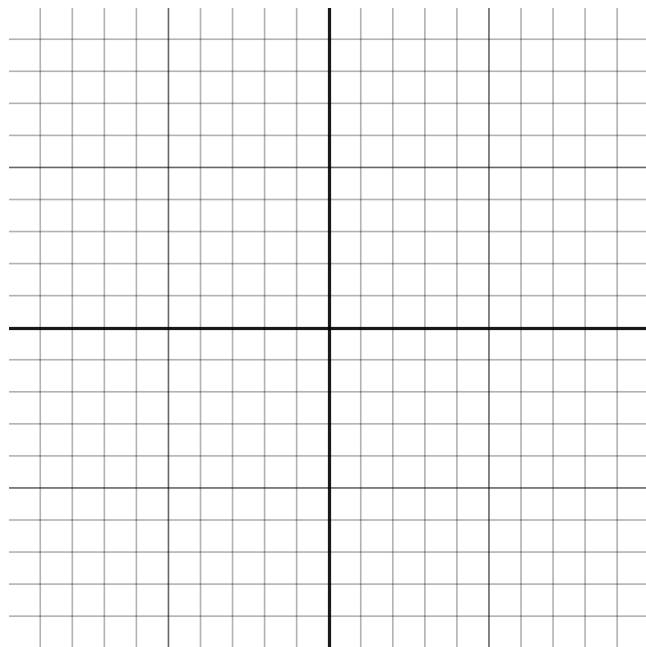
13. Solve for  $v$  in the following equation.

$$\left| \frac{(v+4)(v+5)}{v^2-1} \right| = 1$$



14. For the following function, state the domain, identify the intercepts, analyze the end behavior and sketch the graph.

$$h(x) = \sqrt{x+3}(1+3x)^{-\frac{1}{5}}$$



15. Solve  $\sqrt{t^4 + 9} = \sqrt{6}t$  for  $t$ .

16. Find the intervals where the following inequality is true.  $2x(2x - 3)^{-2} \leq 4(2x - 3)^{-3}$



17. Given  $f(x) = \frac{-3x + 4}{x - 2}$  is a one-to-one function, compute  $f^{-1}(x)$  and state domain and range of  $f(x)$  and  $f^{-1}(x)$ .



18. 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.

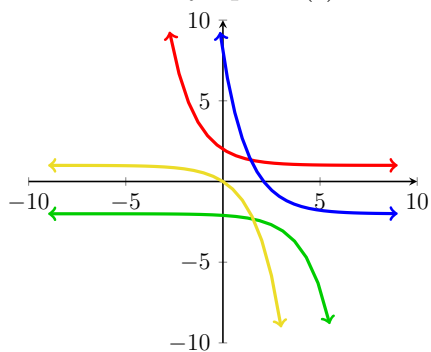
Transformations:

Domain:

$x$ -intercept(s):

$y$ -intercept(s):

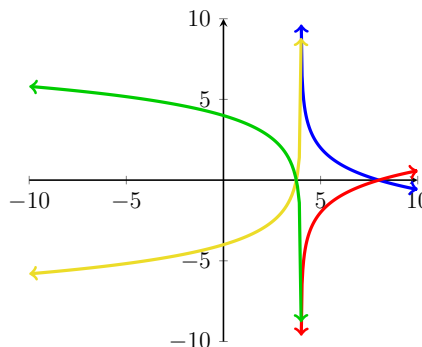
Horizontal Asymptote(s):



If  $g(x)$  is composition of two functions,  $f(x) = 3^x$  and  $h(x)$  such that  $g(x) = h(f(-0.7x))$ . Find  $h(x)$ .

19. 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):



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20. Solve  $\frac{15}{100 + e^{2x}} = 3$  for  $x$ . **Always check for extraneous solutions.**



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

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