

There are 15 problems on this exam. Carefully read and follow all directions. In order to receive credit show all necessary work. No credit will be given for an answer I cannot find or cannot read. All answers should be exact unless specified otherwise.

Use the following four functions to determine the specified information in problems 1-12. (3 points each)

$$a(x) = x^2 + 2x \qquad b(x) = \frac{x+4}{x-24} \qquad c(x) = \sqrt{x-24} \qquad d(x) = 9x - 4$$

1.  $(a \circ d)(7)$

2.  $(d \circ a)(10)$

3.  $(a \circ d)(10)$

4.  $(a \circ c)(40)$

5.  $(c \circ d)(x)$

6.  $(b \circ a)(x)$

7. Domain of  $c \circ d$

8. Domain of  $b \circ a$

9.  $c^{-1}(4)$

10.  $d^{-1}(5)$

11.  $b^{-1}(x)$

12.  $d^{-1}(x)$

13. Let  $g(x) = \left(\frac{1}{5}\right)^{x-2} - 625$ . Use this function to determine the following about this function and its graph. (3 points each)

(a) To graph  $y = g(x)$  how should we transform the graph of  $y = \left(\frac{1}{5}\right)^x$ ?

(b) Domain of  $g$ : \_\_\_\_\_

(c) Range of  $g$ : \_\_\_\_\_

(c)  $y$ -intercept: \_\_\_\_\_

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

(e) Is there a horizontal asymptote on the graph of  $y = g(x)$ ? If yes, what is it?

(f) Is there a vertical asymptote on the graph of  $y = g(x)$ ? If yes, what is it?

(g) Is  $g(x)$  increasing or decreasing?

14. Let  $h(x) = \log_3(x + 81) - 3$ . Use this function to determine the following about this function and its graph. (3 points each)

(a) To graph  $y = h(x)$  how should we transform the graph of  $y = \log_3(x)$ ?

(b) Domain of  $h$ : \_\_\_\_\_

(c) Range of  $h$ : \_\_\_\_\_

(c)  $y$ -intercept: \_\_\_\_\_

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

(e) Is there a horizontal asymptote on the graph of  $y = h(x)$ ? If yes, what is it?

(f) Is there a vertical asymptote on the graph of  $y = h(x)$ ? If yes, what is it?

(g) Is  $h(x)$  increasing or decreasing?

15. Solve each of the following equations for  $x$ . Determine the exact value for  $x$  and a decimal approximation correct to the nearest hundredth. (5 points each)

(a)  $3^x - 15 = 0$

(b)  $\log(x + 7) = \log(2x - 2) + 1$

(c)  $20e^{4x} = 33$