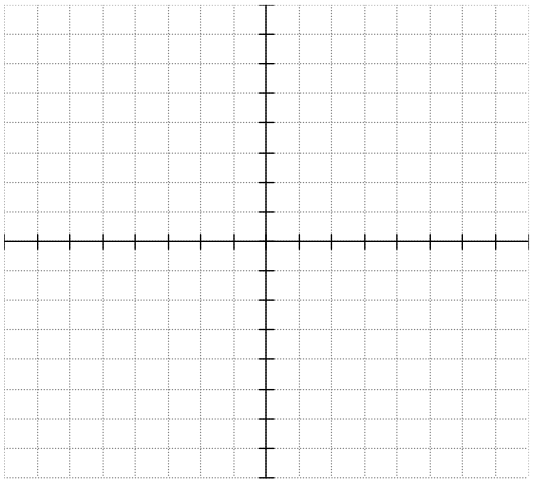
Math 103, Winter 2015, Test 4, Form 1 Name:

1. [5 points] Sketch the graph of $g(x) = 4^x - 2$ and identify the asymptote.



2. [3 points each] Let $f(t) = 20\left(\frac{1}{4}\right)^t$, evaluate

   a. $f(2)$

   b. $f\left(\frac{1}{2}\right)$

3. [3 points each] Let $f(x) = x^2 - 7$ and $g(x) = 3x - 2$. Find and simplify.

   a. $(g \circ f)(4)$

   b. $(f \circ g)(x)$

4. [5 points] Find the inverse function of $f(x) = 7 - 2x$

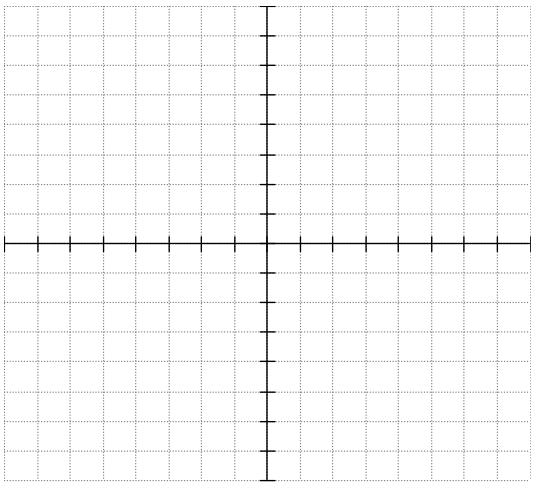
5. [3 points each] Evaluate each logarithm.

   a. $\log_7 49$

   b. $\ln e^3$

   c. $\log_{25} 5$

6. [5 points] Sketch the graph of $h(x) = \log_4(x + 1)$ and identify the asymptote.

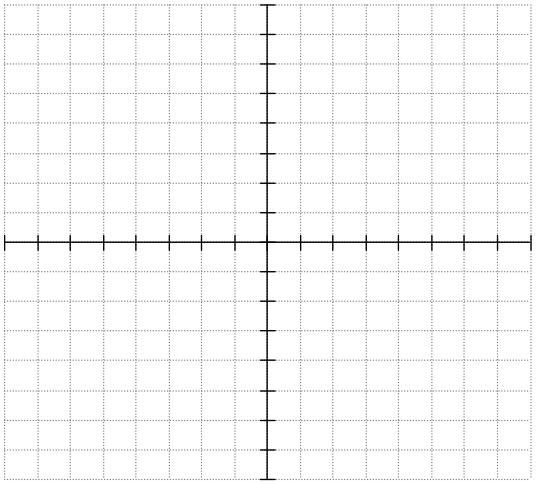


7. [5 points] Use the properties of logarithms to condense the expression. Assume all variables are positive.

   $\ln x - 2\ln y + \ln z$

8. [5 points] Find the x-intercepts of the graph of $(x) = x^2 - 50x$.

9. [5 points] Find the vertex and sketch the graph of $y = -(x-2)^2 + 1$.



10. [5 points] Solve the equation.

$$3^{7-x} = \frac{1}{9}$$

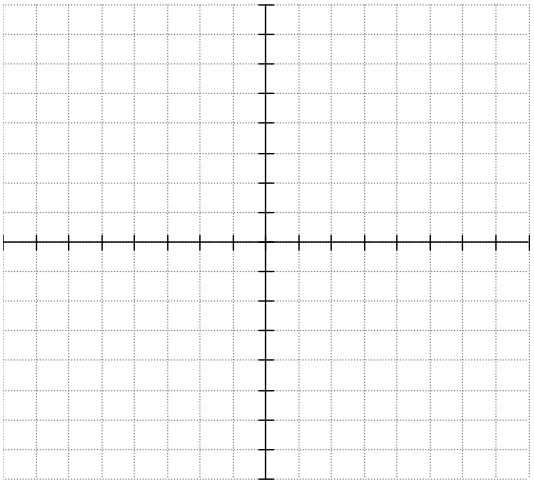
11. [5 points] Use the properties of logarithms to expand the expression. Assume all variables are positive.

$$\log_{10}[x^2(x+1)]$$

12. [5 points] Solve the inequality and graph the solution on the real number line.

$$x^2 + 5x > 6$$

13. [5 points] Sketch the graph of $f(x) = x^2 + 2$ and use the horizontal line test to determine if the function is one-to-one.



14. [5 points] Solve the equation.

$$\log_3(2x + 1) = 2$$

15. [5 points] Solve the equation.

$$\frac{1}{2}e^{-x} = 4$$

16. [5 points] Solve the inequality and graph the solution on the real number line.

$$\frac{2x}{x-7} \leq 0$$

17. [5 points] Write the equation of the parabola in standard form, $y = a(x-h)^2 + k$.

$y = 4x^2 + 24x + 48$

18. [4 points] An amount of $\$1800$ is invested in an account with an annual interest rate of 3% compounded continuously. Find the balance of the account after 15 years. The formula for continuous compounding is $= Pe^{rt}$.

19. [5 points] A person standing close to the edge on the top of a 160-foot building throws a baseball vertically upward. The function $h = -16t^2 + 64t + 160$ models the ball's height above the ground, h, in feet, t seconds after it was thrown. Find the maximum height of the baseball.

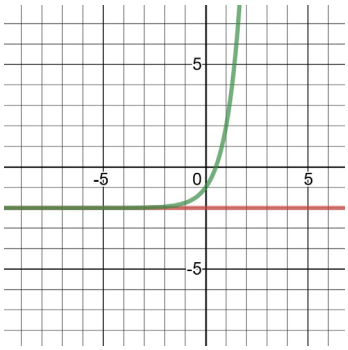
The following problem is extra credit.

1. [5 points] Solve the following equation.

$$2\log_4 x - \log_4(3x + 2) = 2$$

Answers for Math 103 Practice Test 4 (Winter 2015, Form 1)

1. $asymptote: y = -2$



2a. $\frac{5}{4}$

2b. 10

3a. 25

3b. $9x^2 - 12x - 3$

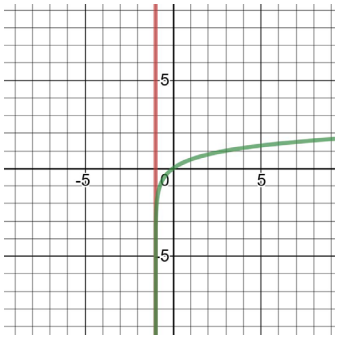
4. $f^{-1}(x) = -\frac{x-7}{2}$

5a. 2

5b. 3

5c. $\frac{1}{2}$

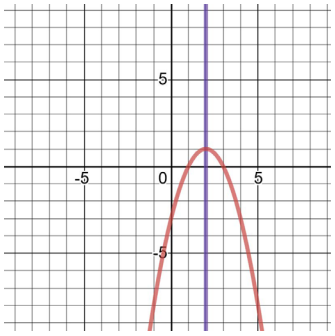
6. $asymptote: x = -1$



7. $\ln\left(\frac{xz}{y^2}\right)$

8. $(0,0) and\ (50,0)$

9. (2,1)

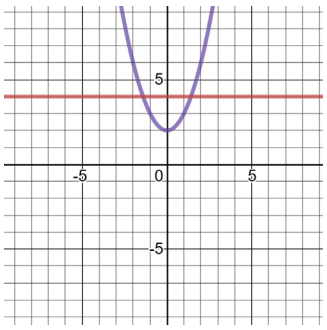


10. $x = 9$

11. $2\log x + \log(x+1)$

12. $(-\infty, -6) \cup (1, \infty)$

13. Not one-to-one (fails horizontal line test)



14. $x = 4$

15. $x = -\ln 8$

Answers for Math 103 Practice Test 4 (W15, F1) continued

16. $[0,7)$

17. $y = 4(x+3)^2 + 12$

18. $\$2822.96$

19. $224\ ft$

EC. $x = 24 + 4\sqrt{38}$