Name:

MAPS College Algebra – Final Exam – Summer 2016

Directions: You will find 22 questions below worth 6 points each. No notes/books/friends are allowed. Graphing calculator models above the level of a TI-84 plus are not allowed (in particular, calculators with a built in CAS and/or QWERTY keyboard are not allowed). You have one hour and thirty minutes to complete this exam.

1. Let $A = [4, 6)$ and $B = (1, 5]$.

a. What is $A \cup B$?

b. What is $A \cap B$?

2. Using the definitions of odd and even, verify if $f(x) = x^2 - 8$ is odd, even, or neither.

3. The revenue function for selling x donuts is $R(x) = 3x$. The cost function for making x donuts is $C(x) = x + 500$. What is the profit function? How many donuts must I sell to make profit?

4. Given $f(x) = x^2$, describe IN WORDS what the graph of $f(x-8)-4$ looks like.

5. The height of a whale (in feet) above the water can be given by the formula $H(t) = -2x^2 + 8x + 1$ where t is the number of seconds after the whale jumped from the water. **When does the whale reach it's maximum height? What is the maximum height?** .

6. Give the equation of a parabola with vertex at $(3, 4)$ that passes through the point $(8, 12)$.

7. What is the domain of $f(x) = \log(x^2 - 64$?

8. Given $f(x) = 3x - 2$ and $g(x) = 5x^2$, compute the following:

a. $f(x) + g(x)$

b. $f(x) - g(x)$

c. $f(x) \times g(x)$

9. Given $f(x) = 8x$ and $g(x) = 3x - 4$, compute the following:

a. $f(g(x))$

b. $g(f(x))$

10. Find the inverse of $f(x) = 6x - 8$.

11. Using **synthetic division**, confirm that $x = 8$ is a zero of $p(x) = x^3 - 15x^2 + 66x - 80$.

12. Find the zeros, horizontal asymptotes, vertical asymptotes, and y-intercept of $r(x) = \frac{x^3-15x^2+66x-80}{x^3}$. Please clearly box your answers.

13. Solve $|2x + 4| \leq 16$.

14. Compute the following:

    a. $\log_9(729) =$

    b. $\log_3(\sqrt[8]{3}) =$

15. Expand $\log(2x^3\sqrt{y}z^4)$.

16. Condense $\log_5(x) + 2$.

17. The half-life of caffeine in healthy adults is 6 hours. If a healthy adult drinks a cup of coffee with 350mg of caffeine at 6AM, how much caffeine will be in their system at 2PM?

18. If you had taken your MAPS stipend and invested it in a savings account that continuously compounded an interest rate of 8 percent, how much money would be in your account after 4 years, assuming that you never withdrew any?

19. Solve $\log_4(x + 12) = 3$.

20. SHOW WORK: Solve the following system of equations using back-substitution:

$$8x + 7y = 36$$
$$4x - 3y = -8$$

21. SHOW WORK: Solve the following system of equations using matrices:

$$8x + 7y = 36$$
$$4x - 3y = -8$$

22. If A is a 2×4 matrix, B is a 3×4 matrix, and C is a 4×3 matrix-tell me if the following products are possible. If possible, give the dimension of the resulting matrix.

a. AB

b. AC

c. BA

d. BC

e. CA

f. CB