Name:
Recitation Instructor:
Recitation Day and Time:

Studio College Algebra – Exam 2 – March 2017

Directions: You will find 16 problems listed below. SHOW ALL WORK!! Each problem is worth 5 points. 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 to complete this exam.

1. Solve $x^2 + 4x - 12 = 0$.

2. Write $x^2 + 6x - 1$ in the form $a(x - h)^2 + k$.

3. A parabola has vertex at $(3, 4)$ and passes through the point $(5, 6)$. What is the equation of the parabola? Write your answer in the form $y = a(x - h)^2 + k$ (DO NOT MULTIPLY OUT).

4. The height of a ball in the air off the ground in meters, t seconds after it is thrown, is given by the equation $s(t) = -4.9t^2 + 12t + 12$. When does the ball hit the ground? (Hint: When the ball hits the ground, what is the distance off the ground? Use this fact, along with the quadratic formula.)

5. Given $h(x) = 4x + 5$ and $k(x) = 9x^2 - 2x$, find $k(x) - h(x)$.

6. Given $r(x) = 5x + 1$ and $m(x) = 16x^3 - 2x$, find $r(x)m(x)$.

7. Consider the functions, $f(x) = x + 1$ and $g(x) = 53$:

   (a) Using the functions above, find $f(2) + g(2)$.

   (b) Using the functions above, find $g(g(g(6000)))$.

8. Solve the quadratic inequality $x^2 - 2 > 7$. (Hint: Use either a graphing or number line method discussed in lecture.)

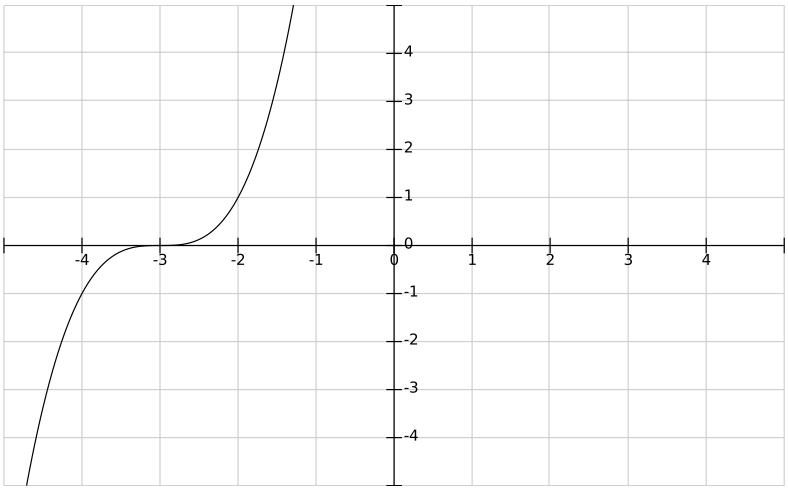
9. Given $f(x) = \dfrac{x-4}{x}$, find $f^{-1}(x)$.

10. Solve and check: $x = \sqrt{x+12}$

11. The profit function for selling x units of a certain product is given by $P(x) = -x^2 + 8x - 2$, where $P(x)$ is measured in **thousands**. For what number of units will there be at least \$5000 in profit? *Hint: instead of using the number 5000 as part of your calculations, what number should be used?*

12. A 3-dimensional cartoon portrays an expanding sphere that grows in volume according to the function $V(r) = \frac{4}{3}\pi r^3$, where r is the radius of the sphere, in millimeters. If the radius grows according to the function $r(t) = 2t$, where t is measured in seconds, find and interpret $V(r(1))$.

13. Given the graph of $f(x)$ below, graph $f(x-1)-2$.



14. Insect resting metabolic rate (RMR) has been found to be scaled positively with body mass (M) according to the equation $RMR = 4.14(M^{0.66})$, where M is measured in mg and RMR is measured in mm^3O_2 per hour. Find the RMR of an insect weighing 2.7 grams.

15. A student claims that all lines, excluding vertical lines, are one-to-one functions. Is the student correct? Use examples in your explanation.

16. Consider the following piecewise function. Write TRUE or FALSE beside each of the statements given below.

$$f(x) = \begin{cases} 14, & x \leq -3 \\ x^2, & -3 < x \leq 2 \\ -x, & x > 2 \end{cases}$$

(a) $f(2) = -2$.
(b) $f(2) = 4$.
(c) $f(-3) = 14$.
(d) $f(-3) = 3$.
(e) $f(-3) = 9$.