Name:
Recitation Instructor:
Recitation Day and Time:

Studio College Algebra – Exam 2 – October 2016

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 $x^2 - 19x + 70 = 0$.

2. Write $x^2 - 10x + 5$ in the form $a(x - h)^2 + k$.

3. A parabola has vertex at $(3, -4)$ and passes through the point $(1, 7)$. 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 $s(t) = -4.9t^2 + 12t + 20$. Answer the questions that follow.)

   (a) Find $s(0)$ and describe its practical meaning.

   (b) What is the practical meaning of solving $s(t) = 0$? (DO NOT SOLVE!).

5. Given $h(x) = 14 - x^2$ and $k(x) = x^2 - 7x$, compute $k(x) - h(x)$.

6. Given $r(x) = 3x - 10$ and $m(x) = x^3 - 4x$, compute $r(x)m(x)$.

7. Consider the functions, $f(x) = x - 5$ and $g(x) = x + 8$:

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

   (b) Using the functions above, find $f(g(f(4)))$.

8. Solve the quadratic inequality $x^2 - 3x < 18$. (Hint: Use either a case analysis, graphing, or number line method discussed in lecture.)

9. Given $g(t) = \dfrac{t+5}{t}$, find $g^{-1}(t)$.

10. Solve and check: $x - 6 = \sqrt{x}$

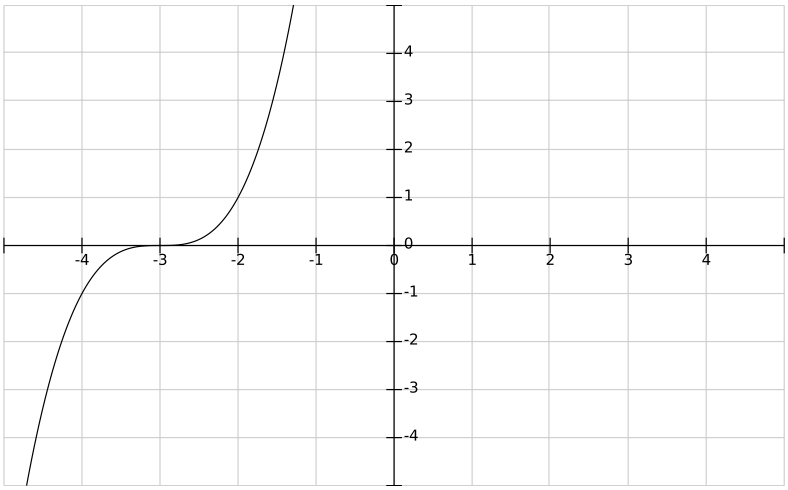
11. The profit function for selling x units of a certain product is given by $P(x) = -x^2 + 900x - 160,000$. Answer the following questions.

    (a) For what number of units is maximum profit achieved? Include appropriate units in your answer.

    (b) What is the maximum profit in this situation? Remember to include appropriate labels (units) in your answer.

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 $r(t) = 3t$, where t is measured in seconds, find $V(r(t))$.

13. Given the graph of $f(x)$ below, graph $f(x-4)-1$.



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 1.4 grams.

15. Consider the function $f(x) = x^2$. Is this a one-to-one function? Explain your reasoning clearly.

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

$$f(x) = \begin{cases} 1, & x \leq -3 \\ x^3 + 1, & -3 < x \leq 2 \\ -x - 6, & x > 2 \end{cases}$$

(a) $f(2) = 9$.

(b) $f(2) = -4$.

(c) $f(-3) = 1$.

(d) $f(-3) = -26$.

(e) $f(-3) = -9$.