Name:
Recitation Instructor:
Recitation Day and Time:

Studio College Algebra – Exam 2 - March 2019

Directions: You will find 16 problems listed below. SHOW ALL WORK!! Each problem is worth 5 points. No notes/books 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 $x^2 + x - 5 = 0$.

2. Write $x^2 + 10x - 1$ in the form $a(x - h)^2 + k$.

3. A parabola has vertex at $(-4, 5)$ and passes through the point $(1, 6)$. What is the equation of the parabola? Write your answer in the form $y = a(x - h)^2 + k$ (DO NOT MULTIPLY OUT).

4. Consider the function $f(x) = x^2 - 13x + 2$. Find the zeros of this function.

5. Given $h(x) = x + 5$ and $k(x) = 7x^2 - 10x$, find $k(x) - h(x)$.

6. Given $r(x) = 2x + 5$ and $m(x) = 12x^3 - x$, find $r(x)m(x)$.

7. Consider the functions, $f(x) = x - 1$ and $g(x) = x^2$:

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

   (b) Using the functions above, find $g(g(g(2)))$.

8. Solve the quadratic inequality $x^2 - 2 > 7$.

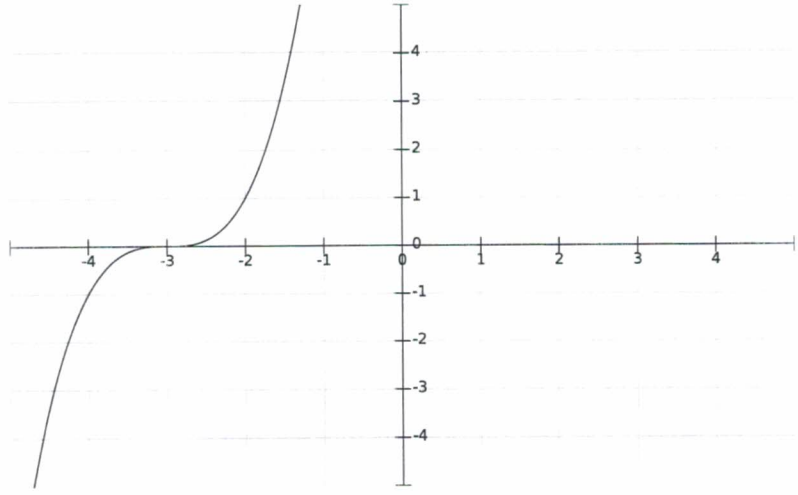
9. Given $f(x) = 2x + 5$, find $f^{-1}(x)$.

10. Solve and check: $x = \sqrt{x + 2}$

11. The height of a ball in the air off the ground in meters, t seconds after it is thrown, is given by the equation $s(t) = -4.9t^2 + 12t + 16$. Roughly over what time interval(s) is the ball at most 18 meters off the ground?

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 100 mg.

15. For what real numbers m is the linear function $f(x) = mx + b$ a slanted line? A horizontal line?

16. Write up a piecewise linear function, $C(x)$, that describes the total monthly cost of water usage based on the table below. Here, x is the number of gallons used.

Monthly Usage (in gallons)	**Monthly Charge**
0-200	\$8, plus \$0.05 per gallon
More than 200, up to 500	\$20, plus \$0.07 for every gallon over 200
More than 500, up to 800	\$42, plus \$0.09 for every gallon over 500