Name:
Recitation Instructor:
Recitation Day and Time:

Studio College Algebra – Exam 2 - March 2022

Directions: You will find 15 problems listed below. SHOW ALL WORK!! Most problems are 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 $(x+2)^2 - 10 = 0$.

2. Write $x^2 + 8x - 6$ in the form $a(x-h)^2 + k$.

3. A parabola has vertex at $(-3, 4)$ and passes through the point $(-4, 8)$. 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 $f(x) = x^2 - 6x - 7$. Find the zeros of this function.

5. Given $h(x) = x + 4$ and $k(x) = 6x^2 - 10x$, find $k(x) - h(x)$.

6. Given $r(x) = x + 1$ and $m(x) = 2x^3 - 4x$, find $r(x)m(x)$.

7. Consider the functions, $f(x) = x - 4$ and $g(x) = x^2$:

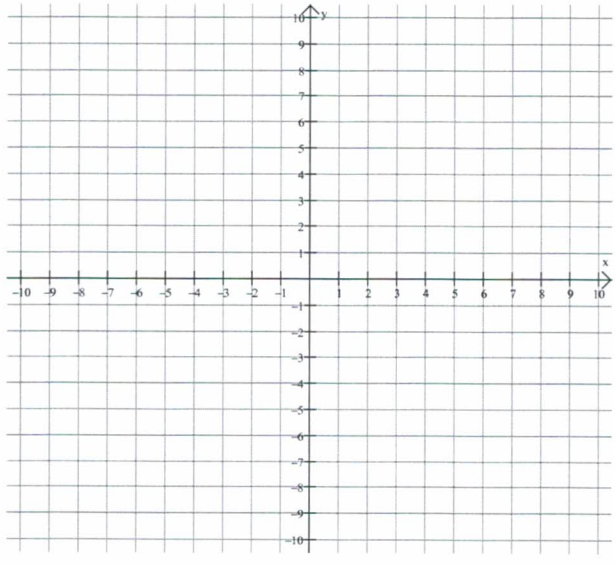
   (a) Using the functions above, find $f(5) + g(5)$.

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

8. Solve the quadratic equation $16x^2 - 2 = 2$.

9. Given $f(x) = 3x + 5$, find $f^{-1}(x)$.

10. Graph the function $f(x) = \sqrt{x}$. Include at least 4 points.



11. Recall that Profit = Revenue - Cost. If the revenue function for sales of a certain product is given by $R(x) = 60x$ and the total cost function for making the product is given by $C(x) = 35x + 450$, where x is a number of units of product and $R(x)$ and $C(x)$ are in dollars, find a profit function, $P(x)$, for this situation.

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 and interpret $V(r(2))$.

13. 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 90 mg.

14. For what real numbers m will the linear function $f(x) = mx + b$ pass the horizontal line test? Explain using terminology from class.

15. (Worth 10 points) 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