Name:
Recitation Instructor, Day, Time:

TRADITIONAL MATH 100 – FINAL EXAM – Fall 2021
Every problem is worth 8 points.

1. Find the distance between the two points $(3, 6)$ and $(2, -5)$.

2. Consider $m(x) = x^2 + x - 9$. Answer the following:
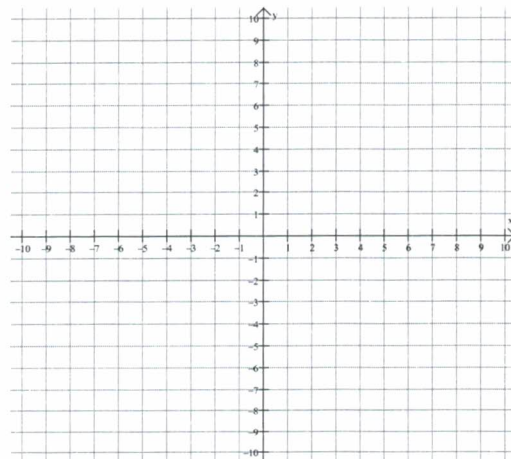
    (a) Find $m(2)$.

    (b) Find $m(-3)$.

    (c) Find $m(a)$ where a is some generic input value.

    (d) Find $m(x + 1)$, and expand completely.

3. Solve for x in the equation $4(6x - 1) - 7 = 2(x - 5) + 3$.

4. Graph $y = -x^2 + 4$ on the grid below. Include at least 6 points on your graph, including the intercepts. Please include a table of ordered pairs as part of your work.

5. Suppose the total cost function for a certain product is given by $C(x) = 60x + 1100$ and the revenue function for the product is given by $R(x) = 98x$. Find a formula for the following functions:

(a) Profit Function, $P(x)$

(b) Average Cost Function, $\overline{C(x)}$

6. Consider the polynomial $p(x) = 13x^4 - 16x^2 + x - 400$. Circle TRUE or FALSE for each of the statements below.

(a) TRUE   FALSE $p(x)$ has odd degree.

(b) TRUE   FALSE $p(x)$ has a negative y-intercept.

(c) TRUE   FALSE $p(x)$ has positive leading coefficient.

(d) TRUE   FALSE   As $x \to \infty$, $p(x) \to \infty$.

7. Consider two quadratic functions given by $f(x) = x^2 - x - 5$ and $g(x) = -2x^2 + 2x + 13$. Find the intersection points of these two parabolas and state your answers as ordered pairs.

8. Suppose the number of vehicle thefts in a given area, from the years 1960 to 1990, could be modeled by the polynomial $p(x) = 30.97x^3 - 1266.9x^2 + 19199x + 29,130$, where x is the number of years since 1960. What is $p(7)$, and what is its meaning in context of the model? Explain in a brief sentence.

9. Find the vertex of the quadratic function $C(x) = x^2 - 8x + 12$. Is the vertex a maximum or minimum, and how do you know?

10. Graph: $f(x) = |x - 1| - 2$. Include all intercepts and at least 6 points on your graph.
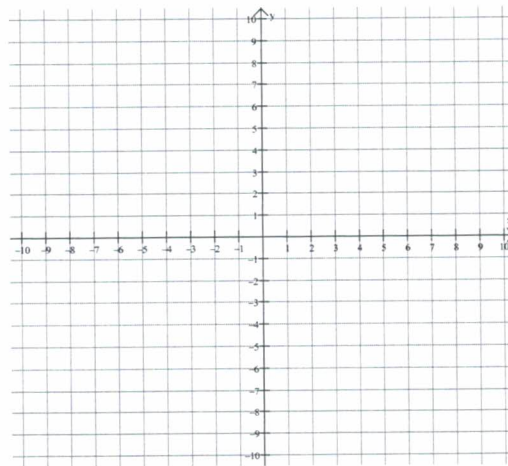
11. Given $g(x) = x^2 + 4x$ and $h(x) = 2x + 5$, find $g(h(x))$.

12. Expand completely using properties of logarithms (you may assume all variables to be positive):

$\log\left(1000x^4\sqrt{y}\right)$

13. In lecture we learned about a formula to find the inverse of a 2×2 matrix. Given A below, write down the formula for A^{-1}.

$$A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$$

14. Find the inverse of the following matrix:

$$\begin{pmatrix} 2 & 4 \\ 1 & -5 \end{pmatrix}$$

15. Solve and check: $x - 2 = \sqrt{3x + 4}$

16. Simplify i^{525}.

17. Given that $x = 1$ is a zero of $p(x) = x^3 - 7x + 6$, find all the other zeros, real or complex, of $p(x)$.

18. Suppose $3400 is invested in an account paying 3% annual interest, compounded continuously. How much time is required for the initial investment to triple?

19. Find the product CD for the matrices given below. Assume that M and R are constants. Show all work!

$$C = \begin{pmatrix} 2 & M \\ R & -5 \end{pmatrix} \qquad D = \begin{pmatrix} 5 & 3 \\ 6 & -1 \end{pmatrix}$$

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20. Set up and solve a system of equations using 2 variables: Cashews cost $10.00 per pound, while almonds cost $12.00 per pound. How much of each type is needed to create 8 pounds of a mixture that costs $10.25 per pound?