Name:
Recitation Instructor, Day, Time:

TRADITIONAL MATH 100 – Exam 2 – March 2022

Directions: You will find 14 problems listed below. No notes/books are allowed. Graphing calculator models above the level of a TI-84 plus are not allowed. You have one hour to complete this exam.

1. (6 points) Find the solutions and check your answers: $4 + 3|x + 5| = 10$.

2. (6 points) Find the solutions to $x^2 + 7x + 6 = 0$.

3. (8 points) Sketch a graph and use it to solve the quadratic inequality $x^2 + 4x + 3 > 0$.

4. (8 points) In a controlled lab environment, some organisms exhibit constant growth over a specific time period. Suppose a certain organism starts out weighing 4 mg, and grows to 10 mg over a 24 hour time period. Find a linear model (in other words, find a linear function) that describes the growth of the organism for $0 \leq t \leq 24$ hours.

5. (6 points) Find an equation of the line passing through $(3, -4)$ and perpendicular to $x + y = 2$.

6. (6 points) Solve: $|x + 1| - 3 < 6$

7. (6 points) 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 $p(7)$? Remember to include units.

8. (6 points) Find the vertex of the quadratic function $C(x) = -x^2 - 8x + 10$. Is the vertex a maximum or minimum, and how do you know?

9. (10 points) Consider the polynomial $p(x) = -13x^5 - 16x^2 + x - 100$. 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.

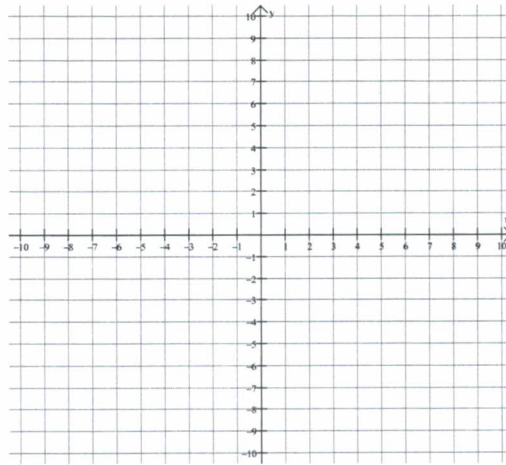(c) TRUE   FALSE $p(x)$ has positive leading coefficient.

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

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

10. (6 points) Solve $|x + 6| > 10$

11. (12 points) 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.

12. (6 points) Graph: $f(x) = |x + 2| - 1$. Include all intercepts and at least 6 points on your graph.

13. (12 points) Solve: $||x - 1| - 24| = 2$.

14. (8 points)

Consider the parabola $f(x) = -(x + 1)^2 + 2$. Answer the following questions. (Drawing a quick sketch of the graph of $f(x)$ may help you.)

(a) What is the domain of $f(x)$?

(b) What is the vertex of $f(x)$?

(c) What is the range of $f(x)$?

(d) What is the axis of symmetry of $f(x)$? Write your answer as an equation, like how we learned in lecture.