Name:
Recitation Instructor, Day, Time:

TRADITIONAL MATH 100 – Exam 2 – March 2019

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.

Page 1 20 pts.	Page 2 20 pts.	Page 3 20 pts.	Page 4 20 pts.	Page 5 20 pts	TOTAL 100 pts

1. (6 points) Find the solutions and check your answers: $2 + 3|x + 1| = 14$.

2. (6 points) Find the solutions to $x^2 - x - 5 = 0$.

3. (8 points) Sketch a graph and use it to solve the quadratic inequality $x^2 - 6x < 0$.

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 2 mg, and grows to 10 mg over a 48 hour time period. Find a linear model (in other words, find a linear function) that describes the growth of the organism for $0 \leq t \leq 48$ hours.

5. (6 points) Find an equation of the line passing through $(1, -2)$ and perpendicular to $x + y = 4$.

6. (6 points) Find the quotient and remainder when $p(x) = x^3 - x^2 + 4$ is divided by $x^2 + 2x - 1$. Write $p(x)$ in the form $d(x)q(x) + r(x)$, where $d(x), q(x)$ and $r(x)$ are the divisor, quotient and remainder, respectively.

7. (5 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 $p(10)$, and what is its meaning in context of the model? Explain in a brief sentence.

8. (5 points) Find the vertex of the quadratic function $C(x) = -x^2 - 12x + 10$. Is the vertex a maximum or minimum, and how do you know?

9. (10 points) Consider the polynomial $p(x) = -4x^5 - 10x^2 + x - 400$. 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 $x \to \infty$, $p(x) \to \infty$.

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

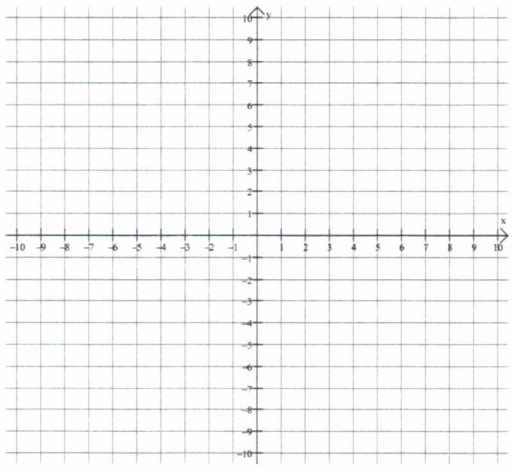
10. (14 points) A 3rd degree polynomial has zeros at $x = 2, x = 4$ and $x = -1$. It also passes through the point $(3, 8)$.

(a) Find the leading coefficient of this polynomial.

(b) Find the constant term of this polynomial.

11. (6 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: $f(x) = |x + 1| - 3$. Include all intercepts and at least 6 points on your graph.



13. (6 points) Solve: $||x - 1| - 24| = 4$.

14. (8 points) Consider the parabola $f(x) = -(x + 2)^2 - 3$. 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 $f(x)$?