Calculus 1 for Social Sciences **Name:** _____
Summer 2019
Exam 3 **Time Limit: 90 min**

- **DO NOT open the exam booklet until you are told to begin. You should write your name and section number at the top and read the instructions.**
- Organize your work, in a reasonably neat and coherent way, in the space provided. If you wish for something to not be graded, please strike it out neatly. I will grade only work on the exam paper, unless you clearly indicate your desire for me to grade work on additional pages.
- You needn't spend your time rewriting definitions or axioms on the exam.
- **Show all your work. Correct answers without supporting work may not receive credit.**
- When you have completed your test, hand it to me and have a great night.

Problem	Points	Score
1	10	
2	20	
3	10	
4	10	
Total:	50	

1. Find $\frac{dy}{dx}$ for the following expressions

   (a) (5 points) $y^2x + xy = 1$

   (b) (5 points) $\sqrt[3]{y} + xy = 2x$

2. For the function $f(x) = x^4 - 4x^2$

   (a) (2 points) find the domain of $f(x)$.

   (b) (2 points) what are the x and y intercepts

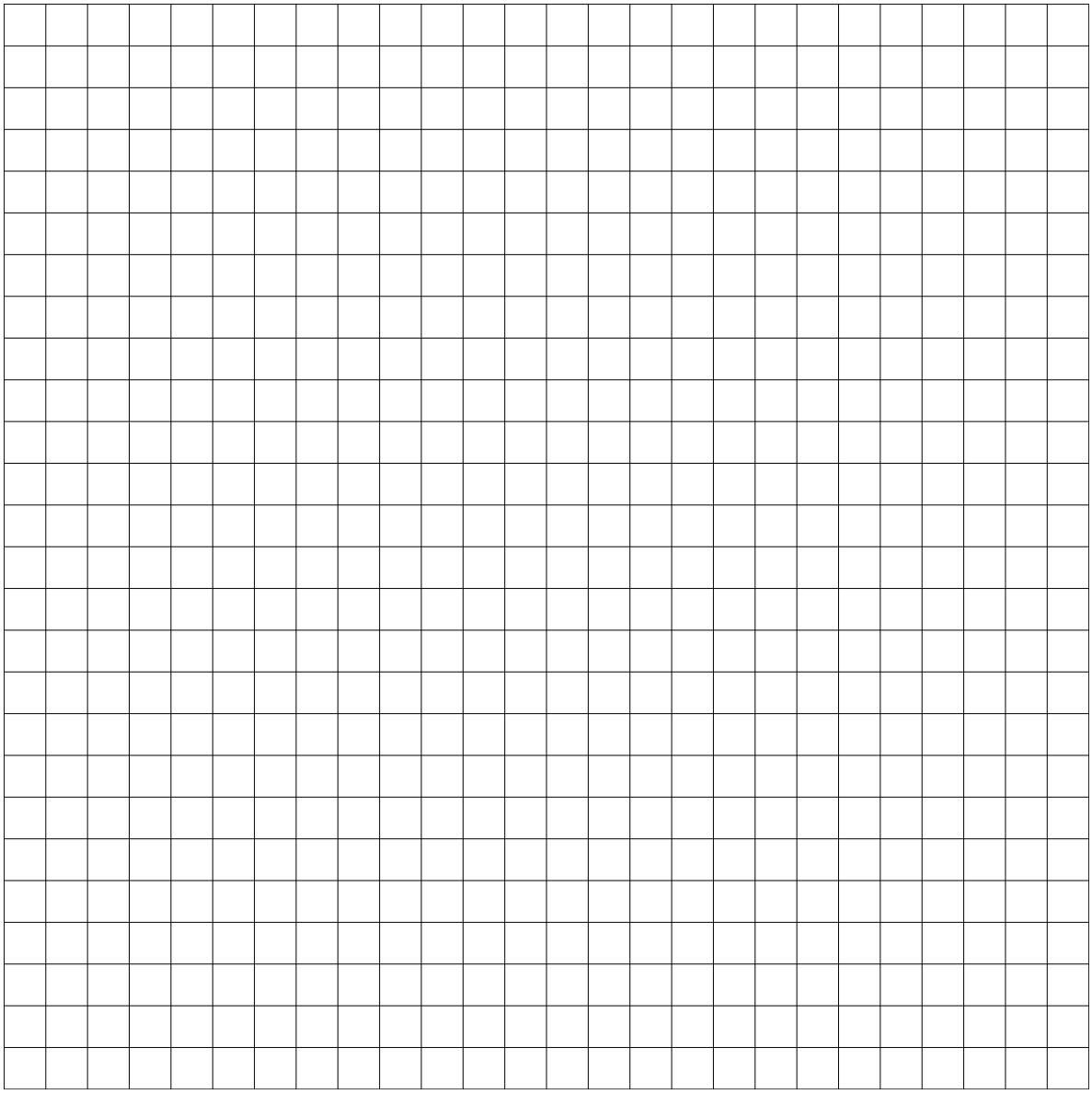
   (c) (3 points) Find the critical numbers of $f(x)$.

(d) (5 points) Find the intervals where $f(x)$ is increasing and decreasing and determine any relative maximum or minimum values.

(e) (5 points) Find the intervals of concavity.

(f) (3 points) Find the inflection points of $f(x)$

3. (10 points) Using the information in the previous question plot the graph on the grid below



4. (10 points) Suppose the border of a town is roughly circular, and the radius of that circle has been increasing at a rate of 0.2 miles each year. Find how fast the area of the town has been increasing when the radius is 4 miles. (note: the area of a circle is given by $A = \pi r^2$ where r is the radius.)