Quiz 9   (3/19/20)   Name: Drill Time:

                                                              TA name:

Directions: This is a take-home quiz. It should be turned in online through blackboard using GradeScope by 11:59pm on **Tuesday March 31**.

Write your solutions on another sheet of paper. The only resources you may use are notes, books, other students *in* the class, the TAs and your instructor. Any other resources (e.g., a friend on your floor, the Internet in general, etc.) are *prohibited* and constitute cheating. When caught you will be referred to the Academic Integrity Office. **You will be graded for completeness and correctness. Include all supporting work. Because you have a long time to complete this, late work will NOT be accepted.**

For problems 1.-4., let $f(x) = xe^x$.

1. (2 points) Identify the critical point(s) of f. Show supporting work.

2. (2 points) Find the intervals where $f(x)$ is increasing and decreasing.

3. (2 points) Find the intervals where f is concave up and concave down.

4. (2 points) At each critical point, use BOTH the first and second derivative test to determine if f has a local extremum. If it does, classify the local extremum. Include summary statements explaining your application of the tests.

5. (2 points) Given the following information about the function g, sketch the graph of g. Be sure to label any interesting points (e.g. local extrema and inflection points).

   (a) g is continuous everywhere and differentiable everywhere except $x = -1$.

   (b) g is increasing on $(-\infty, -1)$ and $(0, 1)$; decreasing on $(-1, 0)$ and $(1, \infty)$

   (c) g is concave up on $(-\infty, -1)$ and $(-1, 1/2)$; concave down on $(1/2, \infty)$

   (d) $g(-1) = g(1) = 1$ are local and global maximum values; $g(0) = 0$ is a local minimum.

   (e) g has an inflection point at $(1/2, 1/2)$.