

Math 242, Exam 1, Fall 2016

Write everything on the blank paper provided. **You should KEEP this piece of paper.** If possible: return the problems in order (use as much paper as necessary), use only one side of each piece of paper, and leave 1 square inch in the upper left hand corner for the staple. If you forget some of these requests, don't worry about it – I will still grade your exam.

The exam is worth 50 points. Each problem is worth 10 points. Please make your work coherent, complete, and correct. Please CIRCLE your answer. Please **CHECK** your answer whenever possible.

The solutions will be posted later today. The quiz on Thursday will be one problem from this exam or one of the assigned homework problems from section 1.6.

**No Calculators or Cell phones.**

- (1) Solve the initial value problem  $2yy' = \frac{x}{\sqrt{x^2 - 16}}$ ,  $y(5) = 2$ . Write your answer in the form  $y = y(x)$ . Check your answer.
- (2) Solve the initial value problem  $y' + y = e^x$ ,  $y(0) = 1$ . Write your answer in the form  $y = y(x)$ . Check your answer.
- (3) Find all constants  $r$  for which  $y(x) = e^{rx}$  is a solution of  $3y'' + 3y' - 4y = 0$ .
- (4) A motor boat is moving at 40 feet per second when its motor suddenly quits and 10 seconds later the boat has slowed to 20 feet/second. The only force acting on the boat is resistance and resistance is proportional to velocity. How far will the boat coast in all?
- (5) A 1500 gallon tank initially contains 600 gallons of water with 5 lbs of salt dissolved in it. Water enters the tank at a rate of 9 gal/hr and the water entering the tank has a salt concentration of  $\frac{1}{5}(1 + \cos t)$  lbs/gal. If a well mixed solution leaves the tank at a rate of 6 gal/hr, how much salt is in the tank at time  $t$ ? **Set up the initial value problem. You do not have to solve it.**