

Math 242, Exam 3, Spring, 2024

**You should KEEP this piece of paper.** Write everything on the **blank paper provided**. Return the problems **in order** (use as much paper as necessary), use **only one side** of each piece of paper. Number your pages and write your name on each page. Take a picture of your exam (for your records) just before you turn the exam in. I will e-mail your grade and my comments to you. **Fold your exam in half** before you turn it in.

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

The solutions will be posted later today.

**No Calculators, Cell phones, computers, notes, etc.**

- (1) Find the general solution of  $x^3 + 3y - xy' = 0$ . (In this problem  $y = y(x)$ .)
- (2) Find the general solution of  $9y'' - 6y' + y = 0$ . (In this problem  $y = y(x)$ .)
- (3) Find the general solution of  $y'' - 4y' + 5y = 0$ . (In this problem  $y = y(x)$ .)
- (4) Find a particular solution of  $y'' + y' + y = \cos 2x$ . (In this problem  $y = y(x)$ .)
- (5) At time zero an object has position  $x_0$  and velocity  $v_0$ . Suppose that the object moves through a resisting medium with resistance proportional to its velocity  $v$ , so that  $\frac{dv}{dt} = -kv$ . Find the velocity and position of the object at time  $t$ .