Name:_____

Student ID:_____

Section:_____

Instructor: Dr. Dang

Math 2320 (Differential Equations)
Practice Exam 1

Instructions:

- Work on scratch paper will not be graded.
- Show all your work in the space provided. Full credit will be given only if the necessary work is shown justifying your answer.
- **Please write neatly. If I cannot read your handwriting, you will not receive credit.**
- Simplify your answers as much as possible. Expressions such as $\ln(1)$, e^0, $\sin(\pi/2)$, etc. must be simplified for full credit.

Show all work in the space provided. Full credit will be given only if all steps are shown justifying your answer. Please write neatly and carefully, if I cannot read your handwriting, you will receive NO credit.

1. (10 points) Solve the separable equation: $\dfrac{dy}{dx} = \dfrac{x}{ye^{x+2y}}$.

2. (10 points) Solve the linear first order equations: $x^2y' - 3xy = x^5 \ln x + 1$.

3. (10 points) Verify that the equation is exact and find a 1-parameter family of solutions of the equation

$$(x+y)^2dx + (2xy + x^2 - 1)dy = 0.$$

4. (10 points) Explain why the equation is homogeneous and use the substitution method to solve.

$$\frac{dy}{dx} = \frac{y(\ln y - \ln x + 1)}{x}.$$

5. (10 points) Solve the given IVP:

$$y'' + 2y' + 2y = 0, y(0) = 2, y'(0) = 1.$$

6. (10 points) Find the general solution to the given differential equation:

$$y^{(5)} - y^{(4)} - 2y''' + 2y'' + y' - y = 0.$$

END OF EXAM