

# Spring 2013, MATH 245, Exam 1

Wednesday, February 13, 2013; 9–9:50am

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Name: \_\_\_\_\_

Circle the time of your discussion section:    **2pm**    **3pm**    **4pm**

## Instructions:

- No notes, books, calculators, etc.
- Answer all questions and clearly indicate your answers.
- **Each problem is worth 10 points.**
- **Show your work!** Points might be taken off for correct answer with no explanations. Wrong answer with no explanations is worth zero points.

| Problem | Possible | Actual |
|---------|----------|--------|
| 1       | 10       |        |
| 2       | 10       |        |
| 3       | 10       |        |
| 4       | 10       |        |
| 5       | 10       |        |
| Total   | 50       |        |



**Problem 1.** For the equation  $y' = y(y - 1)(y + 2)$ , sketch the integral curves and classify each equilibrium solution as asymptotically stable, unstable, or neither.

**Problem 2.** Solve the initial value problem  $y' = \frac{xy^3}{\sqrt{1+x^2}}$ ,  $y(0) = 1$ .



**Problem 3.** Solve the initial value problem  $y' + y = e^{-2t}$ ,  $y(0) = 0$ .

**Problem 4.** Find the general solution of the equation  $(2xy^2 + 2y) + (2x^2y + 2x)y' = 0$ .

**Problem 5.** Find the general solution of the equation  $y'' - 2y' - 3y = 3e^{2t}$ .