QUIZ 2 - MATH 310 Thursday, February 2

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Read each problem **very carefully** before starting to solve it and do only what is asked. Each problem is worth around 5 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. [5 points] Consider the initial value problem

$$(e^y + 3y^2 - 7) + (xe^y + 6xy + 8)\frac{dy}{dx} = 0, \quad y(1) = 0.$$

Check whether the given differential equation is exact and find the particular solution of the initial value problem.

2. [5 points] Find the particular solution of the initial value problem

$$y'' + 2y' - 15y = 0, \quad y(0) = 3,\ y'(0) = -25.$$

3. [4 Bonus Points] Consider the differential equation

$$(x^2y + 3xy - \frac{1}{2}xy^2 - y^2) + (x^2 - xy)\frac{dy}{dx} = 0.$$

Check whether it is exact. If it is, solve it. If it is not, then find an integrating factor $\mu(x)$ that helps make it exact. (In the non-exact case, you do not have to solve the resulting exact equation.)