EXAM 1 - MATH 310   Thursday, February 8
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Read each problem **very carefully** before starting to solve it. Each problem is worth 10 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. Solve the initial value problem

$$y = \frac{ty^2}{\sqrt{1+t^2}}, \quad y(0) = 2.$$

2. Solve the initial value problem

$$ty' + (t+1)y = t, \quad y(1) = \frac{1}{e}, \quad t > 0.$$

3. Consider
$$(3y\cos x + 4xe^x + 2x^2e^x) + (3\sin x + 3)y' = 0.$$
Verify that it is exact and find its general solution.

4. Solve the initial value problem

$$y'' + 5y' + 4y = 0, \quad y(0) = 5, \quad y'(0) = -11.$$

If relevant, express in real form.

5. Solve the initial value problem

$$y'' + 2y' + 5y = 0, \quad y(0) = 3, \quad y'(0) = 10.$$

If relevant, express in real form.