Midterm I Practice Problems

Reminder: If you haven't done so, please sign up for Piazza. You can find the sign-up link of Piazza in the "Announcements" section on Canvas. It is the announcement with title "Piazza".

Midterm I will cover: Section 1.1, 1.2, 2.2, 2.3, 2.4, 2.5, 4.2, 4.3

1. Solve the initial value problem $\frac{dy}{dx} = y^2 - 1, y(0) = 3$. Leave your answer in implicit form. (Hint: $\frac{1}{y^2-1} = \frac{1/2}{y-1} - \frac{1/2}{y+1}$.)

2. Find an explicit solution to the differential equation: $t\frac{dy}{dt} - y = t^2 e^t$ for $t > 0$.

3. Solve the initial value problem

$$(3x^2y^2 + 2xy)dx + (2x^3y + x^2 + 1)dy = 0, \quad y(1) = 1.$$

4. Solve the initial value problem

$$(\frac{x^3}{2y} + ye^x)dx + (1 + 2e^x)dy = 0, \quad y(0) = 1.$$

5. Solve the initial value problem $y'' - 2y' - 3y = 0, \; y(0) = 3, \; y'(0) = 3$.

6. Solve the initial value problem $y'' + 4y' + 4y = 0, \; y(0) = 1, \; y'(0) = 3$.

7. Solve the initial value problem $y'' - y' + y = 0, \; y(0) = 1, \; y'(0) = 3$.