MATH266: Exam I

Name: _____

1. Find a solution to the IVP

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

2. Solve the differential equation

$$x\frac{dy}{dx} + y = xy^{\frac{1}{2}}.$$

3. Solve the equation

$$6t^2(1+\ln y)dt - \left(e^y - \frac{2t^3}{y}\right)dy = 0.$$

Math266: Exam I (page 2) Name:_____

4. When a cup of coffee is served, its temperature is 200°F. Two minutes later the temperature is 170°F. If the temperature of the room is 68°F, how long will it take for the coffee to reach the temperature 140°F? (Take $\ln \frac{11}{6} \approx 0.6$, $\ln \frac{22}{17} \approx 0.26$)

5. Consider the following autonomous differential equation

$$\frac{dy}{dt} = y^2 - y.$$

Find the equilibrium points and study their stability. Sketch several integral curves for this equation.