Name:_____**RUID:**_____

Email:_____

1. (2 pt) Determine the interval where a unique solution is guaranteed to exists for the following IVP

$$(\ln t)y' + y = \cot t, y(2) = 3$$

Answer: _____

2. (3 pt) For the autonomous ODE

$$y' = y^2(y^2 - 4)$$

Find the equilibrium solutions, draw the phase line and determine the stability of each equilibrium.

3. (5 pt) Over the interval $x > 0$, solve the following IVP

$$\left(\frac{y}{x} + 6x\right) + (\ln x - 2)y' = 0, y(1) = 0$$

and determine the interval of existence.