MATH 2070 HOMEWORK 3

1. Find the interval of existence for the following IVPs.

$$y' + \frac{t^4}{(t-2)^8} y = \sqrt{t}, y(1) = 8.$$

$$(1 - t^4)y' + (\ln t)y = \cot 2t, y(2) = 0.$$

2. Determine if the following IVP is reasonably or pathologically formulated.

$$y' = \sqrt{y^2 - 9}, y(-1) = 1.$$

$$y' = \sqrt{y^2 - 9}, y(5) = 3.$$

3. Find the condition for the (x_0, y_0) such that the following IVP is reasonably formulated.

$$y' = \frac{1}{1 + 2y - 3x}, y(x_0) = y_0.$$

$$y' = \sqrt{y + x}, y(x_0) = y_0.$$

$$(y - x)y' = y + x, y(x_0) = y_0.$$

4. Find the equilibrium solutions of the following autonomous ODEs and determine their stability.

$$y' = 10 + 3y - y^2.$$

$$y' = y^2(9 - y^2).$$

$$y' = y \ln(y + 2).$$