QUIZ 1

Each question is worth 10 points. Please write detailed mathematically correct solutions.

1. Use the identity $\dfrac{1}{y-y^2} = \dfrac{1}{y} + \dfrac{1}{1-y}$ to solve the IVP

$$\frac{dy}{dt} = y - y^2, \quad y(1) = 2$$

2. Find the value of k for which the following DE becomes exact, for this k find the general solution

$$\frac{kxy}{1+x^2} + \ln(x^2+1)y' = 0$$

3. For the following autonomous DE find any **three** equilibrium points and classify them,

$$\frac{dy}{dt} = y \sin y$$

4. Use the substitution $y = v^2$ to find the general solution of the following DE,

$$y' + y = \sqrt{y}$$