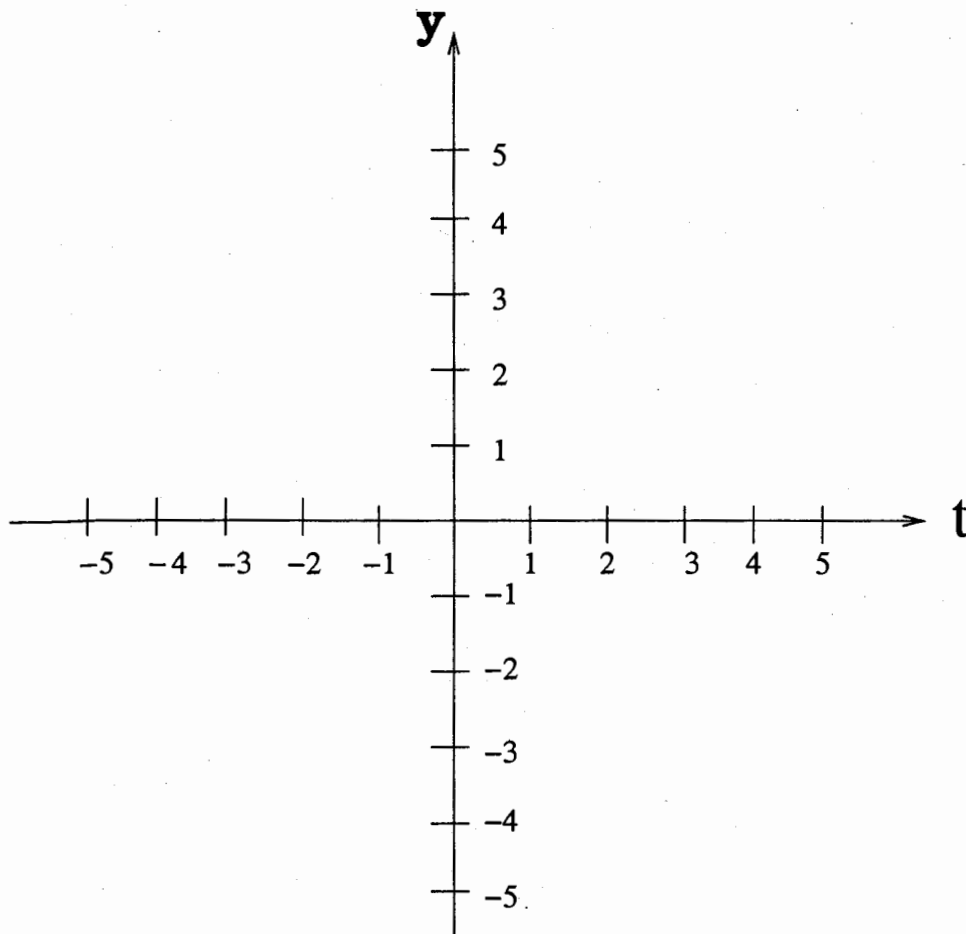1. (a) Draw the directions fields for $-5 \le y \le 5$, $-5 \le t \le 5$ for the differential equation

$$\frac{dy}{dt} = 6 + y - y^2.$$

(b) What is limit as $t \to \infty$ for the solution to initial value problem with $y(-1) = -1$? (You don't have to solve the equation, just give the answer using part (a).)

ANS.

2. Solve the initial value problem

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

ANS.

3. Solve the initial value problem

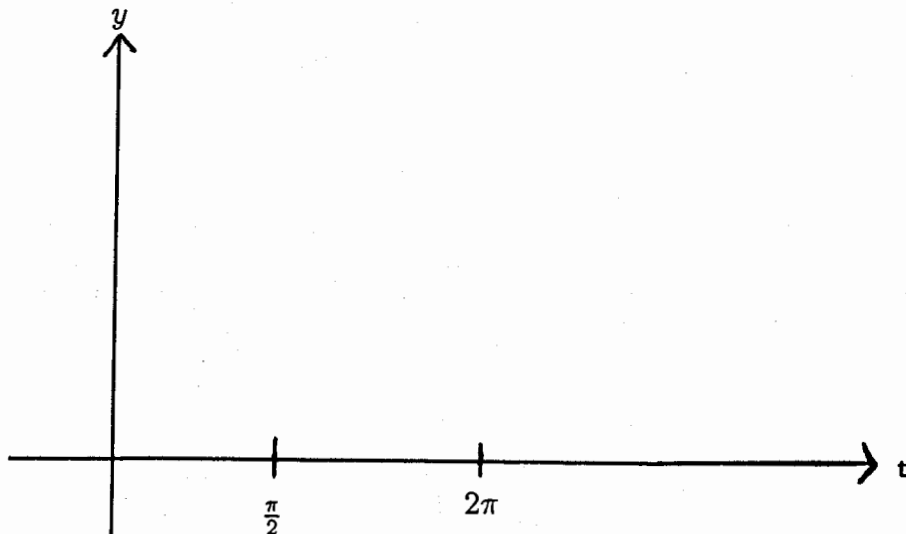$$y'' + 10y' + 25y = \frac{e^{-5t}}{t} + 25, \quad t > 1$$

$$y(1) = 0, \; y'(1) = 0.$$

ANS.

4. Solve the initial value problem

(a) $y''' - y'' + y' - y = 0, \quad y(0) = 1, \quad y'(0) = 0, \quad y''(0) = -1.$

ANS.

(b) Make a sketch of your solution for $0 \le t \le \pi$ below.

5. Use Euler's method to find an approximate solution to the initial value problem

$$\begin{cases} y' = y^2 + t \\ y(0) = 0 \end{cases}$$

at $t = .2$. Use step size $h = .1$.

ANS.