Math 1B Discussion Section Problems

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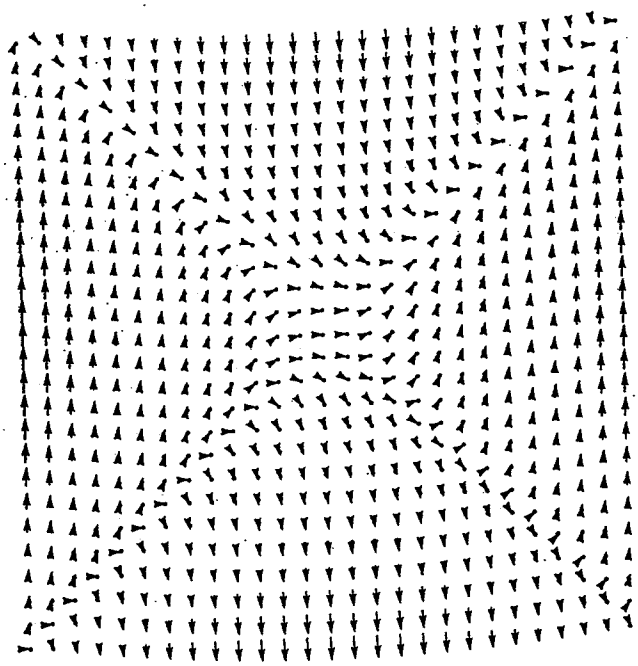
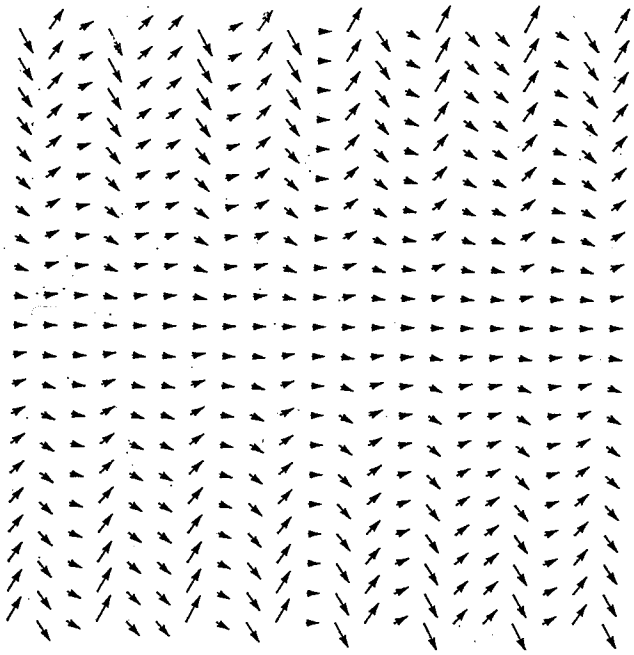
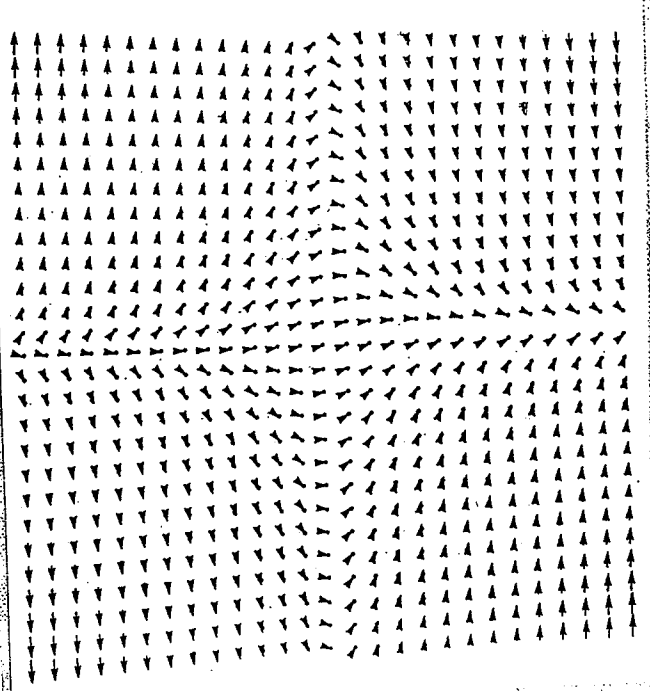
1. On the back of this worksheet, you'll find 4 direction fields.
   (a) Without thinking hardly at all, which one of these is for $y' = 1 + y$? How can you tell?
   (b) The differential equations for the other ones are $y' = x^2 - y^2$, $y' = y\sin(2x)$, and $y' = 1 - xy$. Determine which is which.
   (c) Using the direction fields, sketch some solution curves to $y' = x^2 - y^2$.
2. Solve the following differential equations/initial value problems:
   (a) $y' = xe^y$
   (b) $\dfrac{dy}{dt} = 2 + 2y + t + ty$
   (c) $y' = \dfrac{y\cos x}{1+y^2}$; $y(0) = 1$
   (d) $g' = \dfrac{2t + \sec^2 t}{2g}$; $g(0) = -5$
3. Solve the differential equation $\dfrac{dy}{dx} = \dfrac{y^2 + 2xy}{x^2}$
4. The differential equation $\dfrac{dy}{dx} = ky^{1+c}$ is sometimes called the Doomsday equation.
   (a) Try solving it to figure out why.
   (b) Now suppose the growth of a population of rabits follows the differential equation $y' = 2y^{1.01}$ and suppose there are initially only two rabits. When will this population reach its Doomsday?

Out[22]=



Out[30]=





Out[19]=