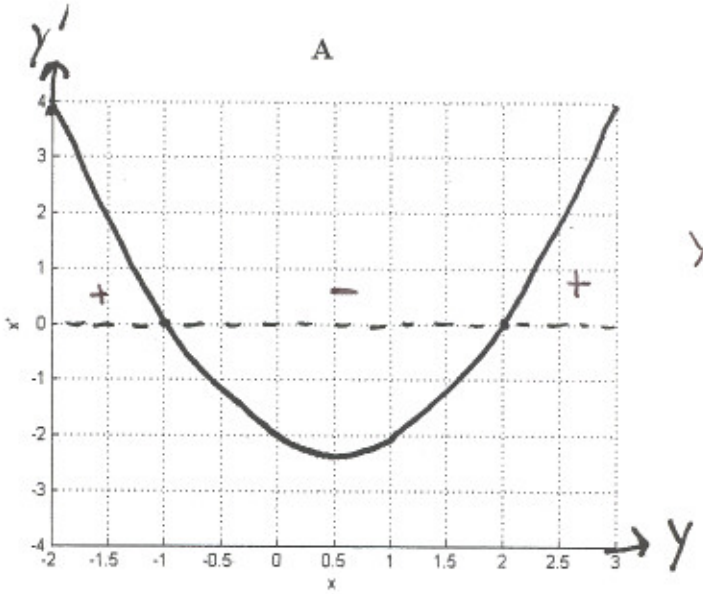
Math 114 Fall 2005 **EXPLAIN YOUR ANSWERS** Quiz **EIGHT**

Consider the rate equation: $\frac{dx}{dt} = (x-2)(x+1)$.

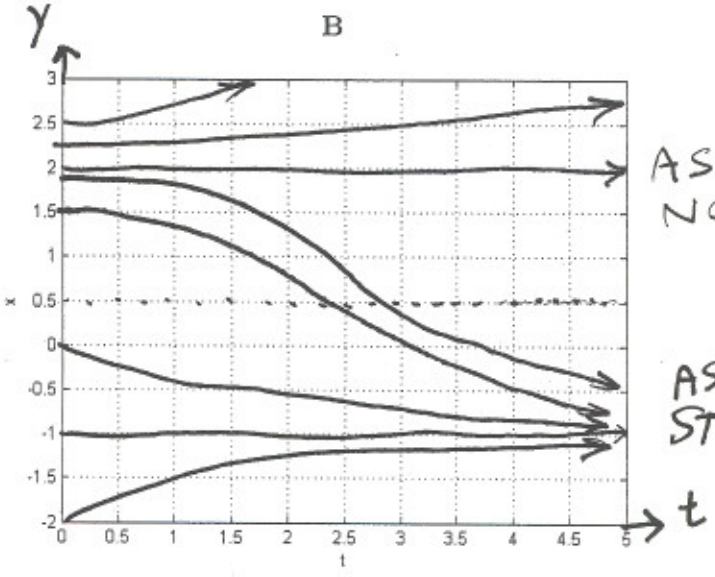
1. *(6 points)* On **(A)** plot the slope function as a function of x. On **(B)** plot at least 5 characteristic solutions of x versus time t. Try to represent all types of solutions that occur. Make sure your solution sketches exhibit reasonable concavity and asymptotic behavior.



CONCAVE UP PARABOLA

y' MIN VALUE AT Y = 0.5

ZEROES AT Y = 2 & Y = -1



ASYMPTOTICALLY NOT STABLE

ASYMPTOTICALLY STABLE

2. *(4 points)*. Identify all equilibrium solutions x^*. Describe (in sentences!) the asymptotic behavior of solutions near the equilibrium solutions.

$x^*(t) = -1$ or $x^*(t) = 2$ are equilibrium solutions. $x^*(t) = -1$ is asymptotically stable and $x^*(t) = 2$ is asymptotically not stable