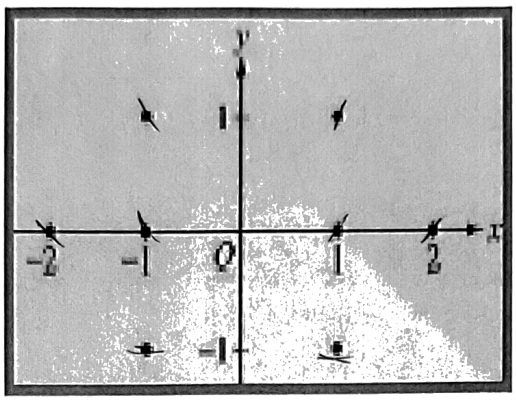
NAME James Ding DATE _____

AP Calculus FRQ #32

Differential Equation

Given: $\frac{dy}{dx} = \frac{1+y}{x}$ and $x \neq 0$

a) On the graph provided, sketch a slope field for the given differential equation at the eight points indicated.



b) Find the particular solution $y = f(x)$ to the given differential equation with the initial condition $f(-1) = 1$. State the domain.

$\frac{dy}{dx} = \frac{1+y}{x}$

$x\,dy = (1+y)\,dx$

$\frac{1}{1+y}\,dy = \frac{1}{x}\,dx$

$\int \frac{1}{1+y}\,dy = \int \frac{1}{x}\,dx$

$\ln|y+1| = \ln|x| + C$

$e^{\ln|y+1|} = e^{\ln|x|+C}$

$y+1 = \pm K e^{\ln|x|}$

$y+1 = k|x|$

$1+1 = k|-1|$

$k = 2$

$y+1 = 2|x|$

$y = 2|x| - 1$