

Name: Solution Section # \_\_\_\_\_ Ser. # \_\_\_\_\_Consider the autonomous first order differential equation  $\frac{dy}{dx} = y^2 + y - 2$ .

- a) Find the critical points and phase portrait, and then classify each critical point in terms of its stability.

$$f(y) = y^2 + y - 2 = 0$$

$$(y-1)(y+2) = 0$$

$\therefore y = 1, -2$  are critical points.

$\nearrow$  unstable  $\nwarrow$  asymptotically stable. [see below]

- b) Sketch the graph of the solution curve determined by the initial condition  $y(0) = -\frac{1}{2}$ .

