Homework: Phase space diagrams: Self-limiting oscillators Name _____

Shown below are three different phase space diagrams. For each case below, identify which diagram could be used to represent that situation. If more than one diagram could apply in a particular case, **specify them all.** If none of the diagrams apply, state so explicitly. Explain your reasoning in each case.

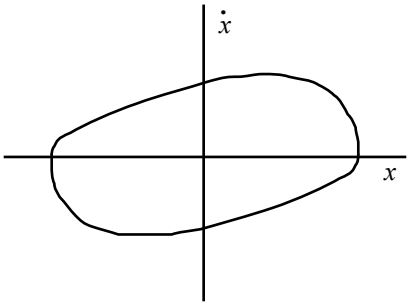

Diagram 1

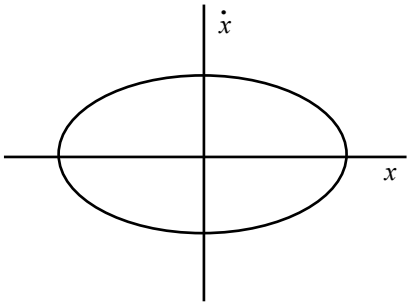

Diagram 2

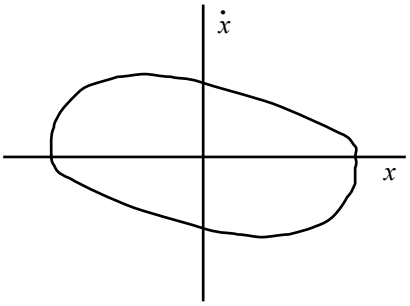

Diagram 3

a. the limit cycle of a non-linear oscillator of the form: $\ddot{x} + \gamma\left(\frac{x^2}{A^2} + \frac{\dot{x}^2}{B^2} - 1\right)\dot{x} + \omega_o^2 x = 0 \quad (\gamma > 0)$

b. the limit cycle of a non-linear oscillator of the form: $\ddot{x} + \gamma\left(\frac{x^2}{A^2} - 1\right)\dot{x} + \omega_o^2 x = 0 \quad (\gamma > 0)$

c. the limit cycle of a non-linear oscillator of the form: $\ddot{x} + \gamma\left(\frac{\dot{x}^2}{B^2} - 1\right)\dot{x} + \omega_o^2 x = 0 \quad (\gamma > 0)$