7. [16 points] In lab we considered the van der Pol system $x' = y$, $y' = -x - \mu y \frac{df}{dx}$. Here, we suppose that $f'(x) = |x| - a$, so that this becomes $x' = y$, $y' = -x - \mu y (|x| - a)$.

a. [3 points] Find the critical point for this system.

b. [3 points] Linearize the system at your critical point from (a).

c. [5 points] Suppose that your linear system from (b) is, for some k that depends on both of μ and a, $\mathbf{x}' = \begin{pmatrix} 0 & 1 \\ -1 & k \end{pmatrix} \mathbf{x}$. Determine the type and stability of the critical point.