Show all work.

1. For the scalar first order equation, \( x'(t) = x(x - 1)(x - 2)(x^2 - 4) \), find all critical points and use a phase-portrait to determine their stability.

2. Determine the stability and the type of the critical point \((0,0)\) of each of the three systems. Match each with one of the three phase-portraits as shown in Fig. 1, Fig. 2 and Fig. 3

\[
\begin{align*}
(a) \quad & x' = x - 2y, \quad y' = x - y; \\
(b) \quad & x' = -x + 5y, \quad y' = -x - 3y; \\
(c) \quad & x' = -3x + 2y, \quad y' = -2x + y.
\end{align*}
\]
3. Consider the system, \( x' = -x + y^2, \ y' = x - 4. \)
(A) Find all critical points.
(B) Compute the Jacobian matrix.
(C) Use the Jacobian matrix to determine the type and stability of each critical point.