2. [14 points]

    a. [10 points] Consider the following differential equations:

        A. $y' = x(y - 2)$ B. $y' = x(x - 1)$ C. $y' = (x - y)y$ D. $y' = (2 - y)(y + 1)^2$

    Each of the following slope fields belongs to one of the differential equations listed above. Indicate which differential equation on the given line. Find the equation of the equilibrium solutions and their stability. If a slope field has no equilibrium solutions, write none.

Differential equation: **B**

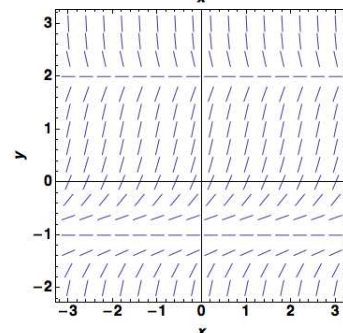Equilibrium solutions and stability:

None
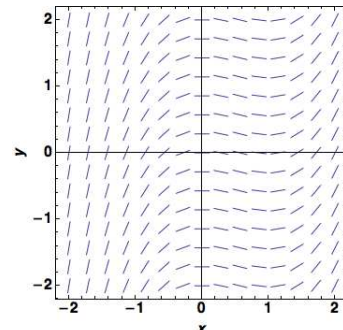
Differential equation: **D**

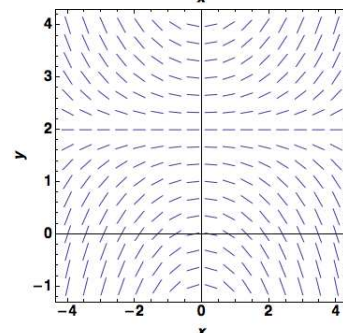Equilibrium solutions and stability:

-   $y = -1$ unstable (or semistable).

-   $y = 2$ stable.

Differential equation: **A**

Equilibrium solutions and stability:

    $y = 2$ unstable.

    b. [4 points] Find the regions in the x-y plane where the solution curves to the differential equation $y' = (y - x^2)y$ are increasing.

        Solution: $y' > 0$ if:
            -    $y > x^2$, or
            -    $y < 0$.