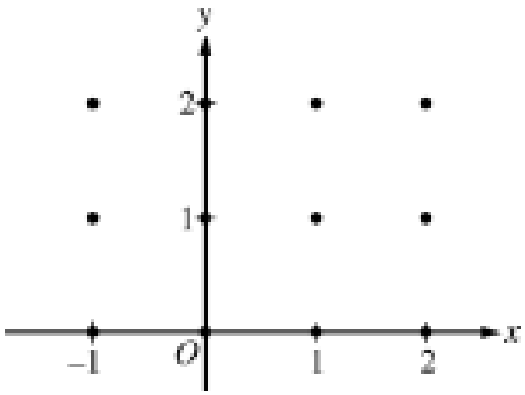
SLOPE FIELD PRACTICE: Free Response

4. Consider the differential equation $\frac{dy}{dx} = 2x - y$.

a. On the axes provided, sketch a slope field for the given differential equation at the twelve points indicated, and sketch the solution curve that passes through the point (0, 1)

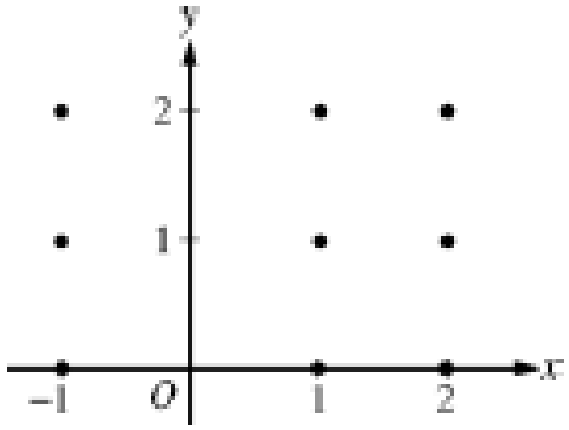


b. Let y = f(x) be the particular solution to the given differential equation with the initial condition f(0) = 1. Use Euler's method, starting at x = 0 with two steps of equal size, to approximate f(-.4). Show the work that leads to your answer.

c. Find $\frac{d^2y}{dx^2}$ in terms of x and y. Determine whether the approximation found in part (b) is an overestimate or underestimate. Justify your answer.

5. Consider the differential equation $\frac{dy}{dx} = \frac{y-1}{x^2}$, where $x \neq 0$.

a) On the axis provided, sketch a slope field for the given differential equation at the nine points indicated.



b) Find the particular solution y = f(x) to the differential equation with the initial condition f(2) = 0.

c) For the particular solution y = f(x) described in part (b), find $\lim_{x \to \infty} f(x)$.