

3020 DIFFERENTIAL EQUATION. HOMEWORK 2

1. Consider the autonomous differential equation

$$\frac{dy}{dx} = y^3 - 2y^2 + y.$$

Make a rough sketch of the slope field without using any technology.

2. Perform Euler's method with the step $\Delta x = 0.25$ on the following initial value problem: $\frac{dy}{dx} = x - y^2$, $y(0) = 1$, over the interval $0 \leq x \leq 1$. Sketch the graph of the approximate solution.

3. Sketch the phase line of the differential equation $\frac{dy}{dx} = y \ln |y|$. Identify the equilibrium points as sinks, sources, or nodes.

4. Find the general solution of the equation $\frac{dy}{dx} = 2y + \sin(2x)$.