Euler's Method

1. (a) Given the differential equation $\frac{dy}{dx} = x + 2$ and $y(0) = 3$. Find the approximation for $y(1)$ by using Euler's method with two equal steps.

(b) Solve the differential equation $\frac{dy}{dx} = x + 2$ with the initial $y(0) = 3$, and use your solution to find $y(1)$.

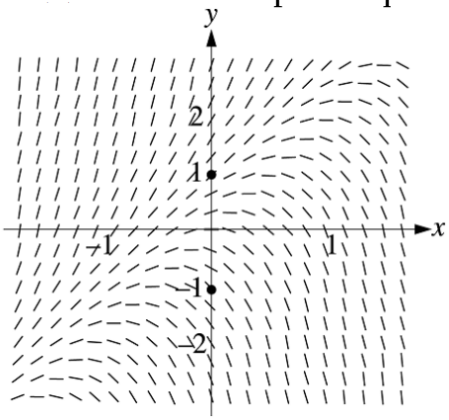
2. Use Euler's method and a step size of $\Delta x = 0.2$ to compute $y(1)$ if $y(x)$ is the solution of the differential equation $\frac{dy}{dx} + 4x^3y = 2x^3$ with initial condition $y(0) = 2$.

A. 4.8 B. 1.19 C. -12.45 D. 5.67 E. -2.4

3.Given $\frac{dy}{dx} = 2\sin(4\pi t)$ and $y(1) = 2$, approximate $y(3)$ using five equal steps.

A. 8 B. -17 C. -2 D. 17 E. 2

4. Let $y = f(x)$ be the particular solution to the differential equation $\frac{dy}{dx} = x + 2y$ with the initial condition $f(0) = 1$. Use Euler's Method, starting at $x = 0$ with two steps of equal size to approximate $f(-0.6)$.



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

(a) The slope field for the given differential equation is provided. Sketch the solution curve that passes through the point (0,1) and sketch the solution curve that passes through the point $(0, -1)$.

(b) Let f be the function that satisfies the given differential equation with the initial condition $f(0) = 1$. Use Euler's method, starting at $x = 0$ with a step size of 0.1, to approximate $f(0.2)$.

(c) Find the value of b for which $y = 2x + b$ is a solution to the given differential equation. Justify your answer.