AB Calculus Euler's Method Homework Name: ___________________________________

1. Find the particular solution y = f(x) using the given initial condition.

a) $\frac{dy}{dx} = -\frac{1}{x^2} - \frac{3}{x^4} + 12$ and $y = 3$ when $x = 1$.

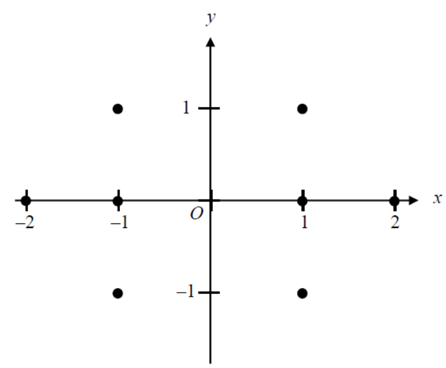
b) $\frac{dx}{dt} = \frac{1}{t} - \frac{1}{t^2} + 6$ and $x = 0$ when $t = 1$.

c) $\frac{du}{dx} = 7x^6 - 3x^2 + 5$ and $u = 1$ when $x = 1$.

d) $\frac{dv}{dt} = 4\sec t \tan t + e^t + 6t$ and $v = 5$ when $t = 0$.

2. [No Calculator] Consider the differential equation $\frac{dy}{dx} = \frac{y}{x}$, where $x \neq 0$.

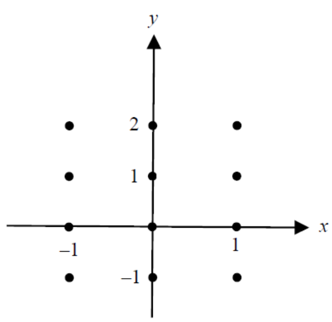
a) On the axes provided, sketch a slope field for the given differential equation at the eight points indicated.



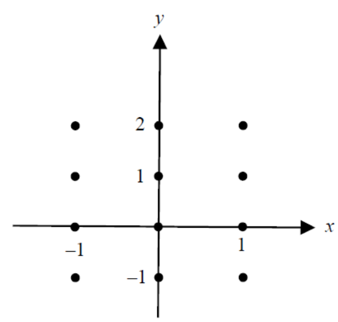
b) Find the particular solution $y = f(x)$ to the differential equation with the initial condition $f(-1) = 1$ and <u>state its domain</u>.

3. Construct a slope field for each differential equation. Draw tiny segments through the twelve lattice points shown in the graph.

a) $\frac{dy}{dx} = 2y$



b) $\frac{dy}{dx} = \frac{x}{2y}$



For each slope field above, sketch the solution curve that passes through the point (0, 1).

4. Answer the following questions.

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

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

c) The error in using Euler's Method is the difference between the approximate value and the exact value. What was the error in your answer? How could you produce a smaller error using Euler's Method?

5. Suppose a continuous function f and its derivative f' have values that are given in the following table. Given that $f(2) = 5$, use Euler's Method with two steps of size $\Delta x = 0.5$ to approximate the value of $f(3)$.

x	2.0	2.5	3.0
$f'(x)$	0.4	0.6	0.8
$f(x)$	5		