Math 11B Discussion Section

With your group, come up with plain language definitions for the following terms. Write down the associated formulas where applicable.

- Direction Field
- Euler's Method
- Separable Equations

(1) Consider the differential equation $y' = y + xy$ and let $f(x, y) = y + xy$.

(a) Compute the following table

$f(-2,3)$	$f(-1,3)$	$f(0,3)$	$f(1,3)$	$f(2,3)$
$f(-2,2)$	$f(-1,2)$	$f(0,2)$	$f(1,2)$	$f(2,2)$
$f(-2,1)$	$f(-1,1)$	$f(0,1)$	$f(1,1)$	$f(2,1)$
$f(-2,0)$	$f(-1,0)$	$f(0,0)$	$f(1,0)$	$f(2,0)$
$f(-2,-1)$	$f(-1,-1)$	$f(0,-1)$	$f(1,-1)$	$f(2,-1)$

(b) Sketch a solution curve which passes through $(0,1)$.

(2) Use Euler's method with step size 0.5 to compute the approximate y-values y_1, y_2, y_3, and y_4 of the solution to the initial-value problem $y' = y - 2x$, $y(1) = 0$.

(3) Program a calculator or computer to use Euler's method to compute $y(1)$, where $y(x)$ is the solution of the initial-value problem

$$\frac{dy}{dx} + 3x^2 y = 6x^2, \quad y(0) = 3$$

for a step size of $h = 0.01$.

Verify that $y = 2 + e^{-x^3}$ is the exact solution of the differential equation.

(4) Find the solution of the differential equation which satisfies the given initial condition.

(a) $\frac{dy}{dx} = \frac{x}{y}$, $y(0) = -3$.

(b) $P' = \sqrt{Pt}$, $P(1) = 2$.