MA 182 **INTRODUCTION TO EULER'S METHOD**
Section 7.2

You are going to use Euler's Method, with increments of 0.5, to draw an approximation to the solution to the differential equation $\frac{dy}{dx} = x - y$ that has the initial condition y(0) = 3.

1. Starting at the point (0,3), compute the slope of the tangent line.

2. Draw a tangent line with this slope at (0,3). Extend it to the point where x = 0.5. Estimate the y-coordinate.

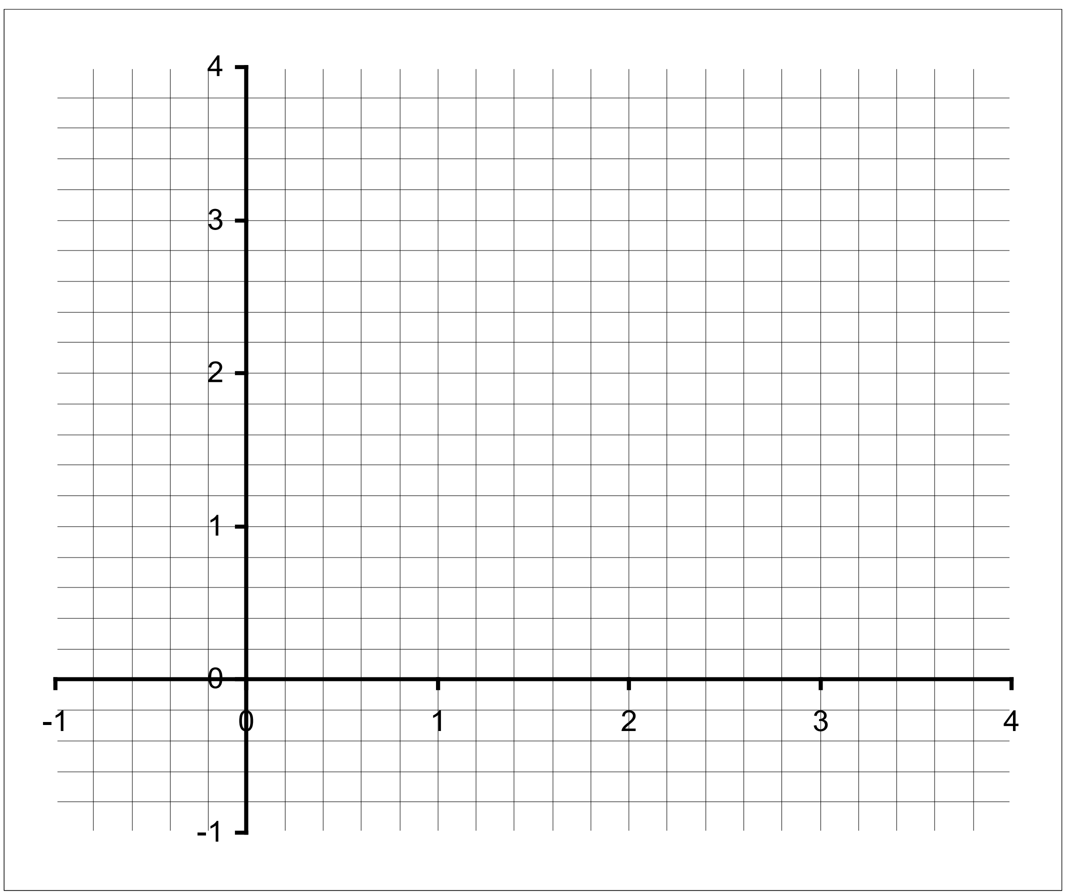
3. Using x = 0.5 and the y-coordinate you found in step 2, compute the slope of the new tangent line. (Remember that $\frac{dy}{dx} = x - y$ gives the slope of the tangent line at any point.)

4. Draw a new tangent line at the point where x = 0.5 and extend it to the point where x = 1. Again, estimate the y-coordinate.

5. Using x = 1 and the y-coordinate you found in step 4, compute the slope of the third tangent line.

6. Draw the tangent line from the point where x = 1 to the point where x = 1.5, approximate the new y-coordinate, find a new slope and draw a new tangent line.

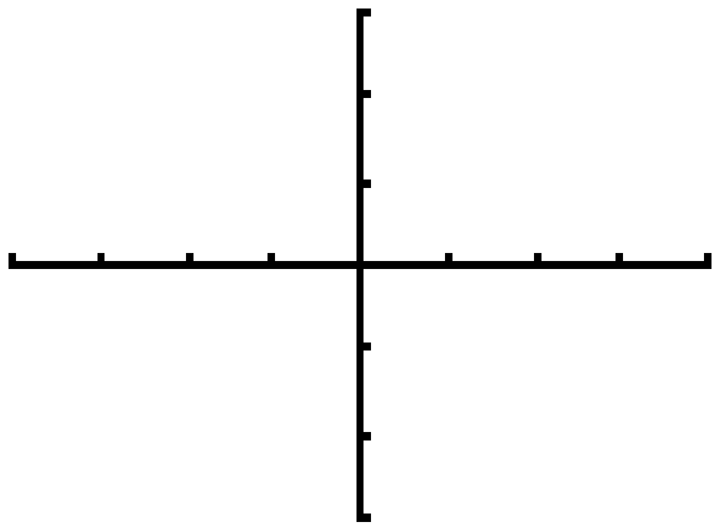
7. Repeat this process at x = 2, x = 2.5, and x = 3.



You now have a curve that approximates a function y(x) that is the solution to the initial-value problem $\frac{dy}{dx} = x - y$, y(0) = 3. From your graph, estimate the value of y(3).

A) Sketch the direction (slope) field of the differential equation $y' = x - y$

x	y	$y' = x - y$		x	y	$y' = x - y$
-2	0			-2	2	
-1	0			-1	2	
0	0			0	2	
1	0			1	2	
2	0			2	2	
-2	1			-2	-1	
-1	1			-1	-1	
0	1			0	-1	
1	1			1	-1	
2	1			2	-1	



B) Use your slope field to sketch a solution curve that passes through the point (1, 0)

C) Use Euler's method with step size 0.1 to estimate y(1.4), where y(x) is the solution of the initial value problem $y' = x - y$, $\frac{dy}{dx} = x - y$, $y(1) = 0$

D) Sketch the Euler graph on the same axes as your slope field.