Math 2080: Differential Equations
Worksheet 1.3: Approximating solutions to differential equations

NAME:

1. Consider the initial value problem $y' = t + y$, $y(0) = 1$.

   (a) When computing a solution by hand using Euler's method, it is beneficial to arrange your work in a table, as shown below where the first step is computed. Continue with Euler's method using step-size $h = 0.1$ and complete all missing entries of the table.

k	t_k	y_k	$f(t_k, y_k) = t_k + y_k$	h	$f(t_k, y_k) \cdot h$
0	0.0	1.0	1.0	0.1	0.1
1	0.1	1.1			
2	0.2				
3	0.3				
4	0.4				
5	0.5				

   (b) The general solution of $y' = t + y$ is $y(t) = Ce^t - t - 1$. Using this, compute the actual value of $y(0.5)$. Use a calculator to see how close this is to the approximated answer you got using Euler's method.