Differential Equations - Introduction to Numerical Methods

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Error in Eulers Method
Examine the error for the solutions that we found in the last class:

$$\frac{dy}{dx} = e^{x^2} \quad y(0) = 1$$

1. How much were we reducing h each time? What do you expect your ratio of errors to be based on how you are reducing h?
2. Calculate the approximate error by subtracting the approximations - you can use the numbers you wrote into the last worksheet, or use the Python code I provided. Fill in the table below. Recall that

$$ERROR \sim |y_h - y_{\frac{h}{10}}|$$

h	Error in $y(1)$	Ratio of errors
.1	—–-	—–-
.01		—–-
.001		
.0001		
...		

   Here I am only asking for the approximate error because we don't know the real solution.
3. Answer the following questions:
   - Did your ratio of errors reduce as expected?
   - Is your approximation converging to a solution?
   - For the largest h value that you calculated, about how many decimal places of accuracy do you have?

Repeat the steps 1-4

$$y' = x^2 - y^2 \qquad y(0) = 1$$

h	Error in $y(1)$	Ratio of errors
.1	—–-	—–-
.01		—–-
.001		
.0001		
...		