

Euler's Method Assignment

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Euler's Method Assignment

Question 0

Watch the lecture video [here](#).

Did you watch the video? [Type yes or no.]

Question 1

Use Euler's Method to graph an approximate solution curve to $\frac{dy}{dx} = x^2 - y^2$ with initial value $(1, 2)$. Graph on the interval from $x = 1$ to $x = 3$ and use $n = 20$ steps.

Question 2

Consider the initial value problem $\frac{dy}{dx} = 6x^2 - 3x^2y$ $y(0) = 3$.

Part a

Use Euler's Method with $n = 50$ steps to graph an approximate solution curve on the interval from $x = 0$ to $x = 1$.

Part b

The exact solution of this differential equation is $y = 2 + e^{-x^3}$. Add a graph of this curve to your graph in part a.

Question 3

Consider the initial value problem $\frac{dy}{dx} = y^2 \cos(x)$, $y(0) = 0.5$.

Part a

Approximate $y\left(\frac{\pi}{6}\right)$ using Euler's Method with $n = 20$.

Part b

Use desolve to find the exact solution of the original initial value problem.

[You'll have to solve for y , either by hand or use Sage.]

Part c

Using the solution from part b, find the exact value of $y\left(\frac{\pi}{6}\right)$.

Part d

Subtract your approximation (part a) from the exact value (part c). This is the error.

Part e

Approximate $y\left(\frac{\pi}{6}\right)$ using Euler's Method with $n = 50$.

Part f

Calculate the new error. [This should be smaller than the error in part d.]