<u>Coding Assignment 6</u>

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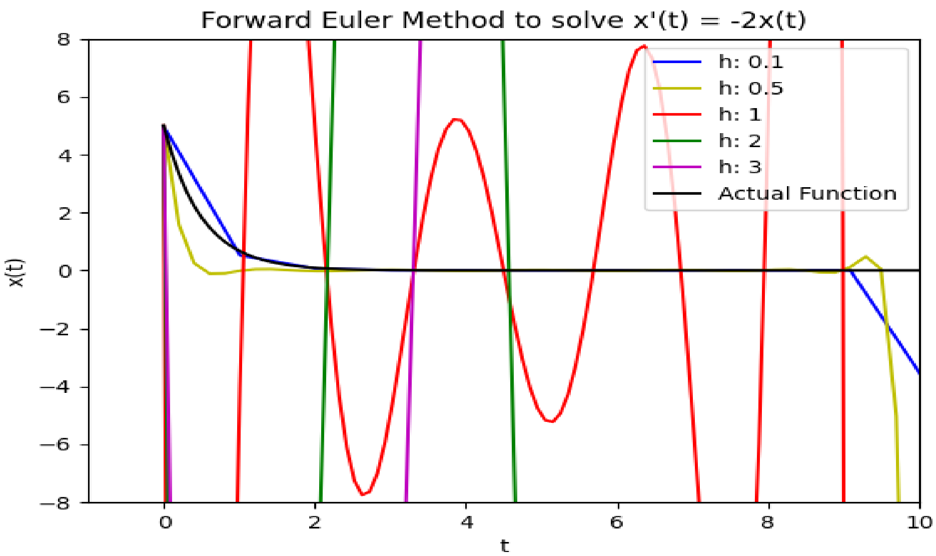
Q1. Approach mentioned in comments.



Polynomial solutions which I got using Forward Euler Method, for different values of h are as follows:

for h = 0.1, Polynomial equation is:
$4.98-10.73x+10.77x^2-6.36x^3+2.34x^4-0.53x^5+0.07x^6$

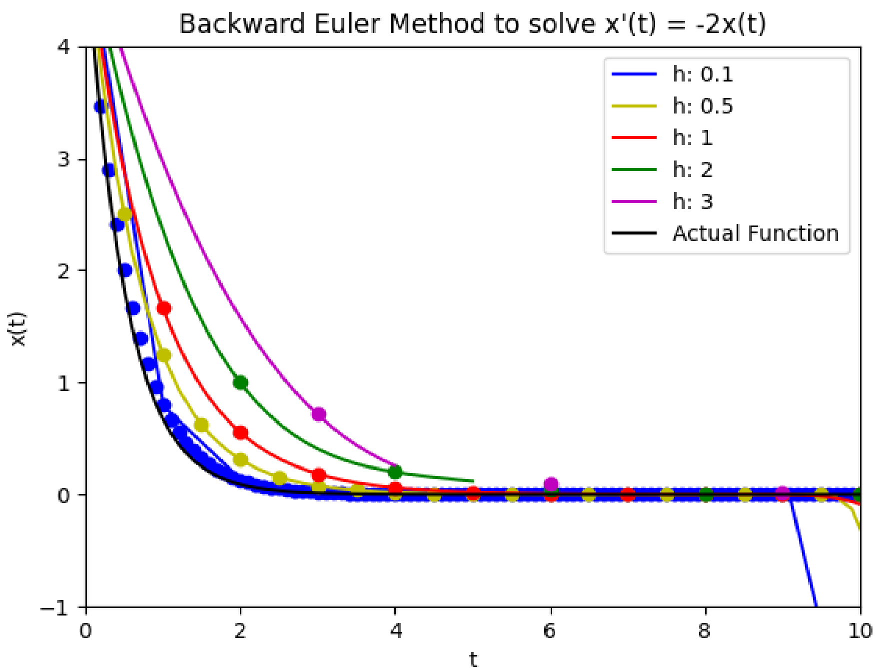
for h = 0.5, Polynomial equation is:
$5.0-24.77x+47.35x^2-47.03x^3+27.16x^4-9.54x^5+2.04x^6-0.26x^7+0.02x^8$

for h = 1, Polynomial equation is:
$5.0-674.51x+1666.98x^2-1629.71x^3+837.3x^4-250.8x^5+45.33x^6-4.87x^7+0.29x^8-0.01x^9$

for h = 2, Polynomial equation is:
$5.0-243.33x+196.67x^2-46.67x^3+3.33x^4$

for h = 3, Polynomial equation is:
$5.0-160.0x+70.0x^2-6.67x^3$

Q2. Approach mentioned in comments.



Polynomial solutions which I got using Backward Euler Method, for different values of h are as follows:

for h = 0.1, Polynomial equation is:
$4.99-8.94x+7.66x^2-3.98x^3+1.33x^4-0.28x^5+0.03x^6$

for h = 0.5, Polynomial equation is:
$5.0-6.93x+4.77x^2-2.15x^3+0.7x^4-0.16x^5+0.03x^6$

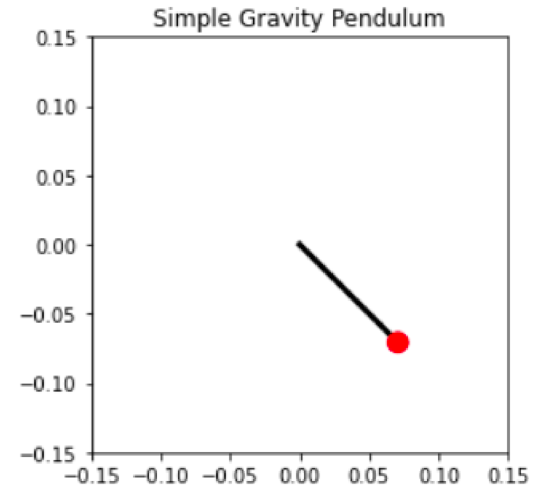
for h = 1, Polynomial equation is:
$5.0-5.47x+2.95x^2-1.02x^3+0.25x^4-0.04x^5+0.01x^6$

for h = 2, Polynomial equation is:
$5.0-3.48x+0.95x^2-0.12x^3+0.01x^4$

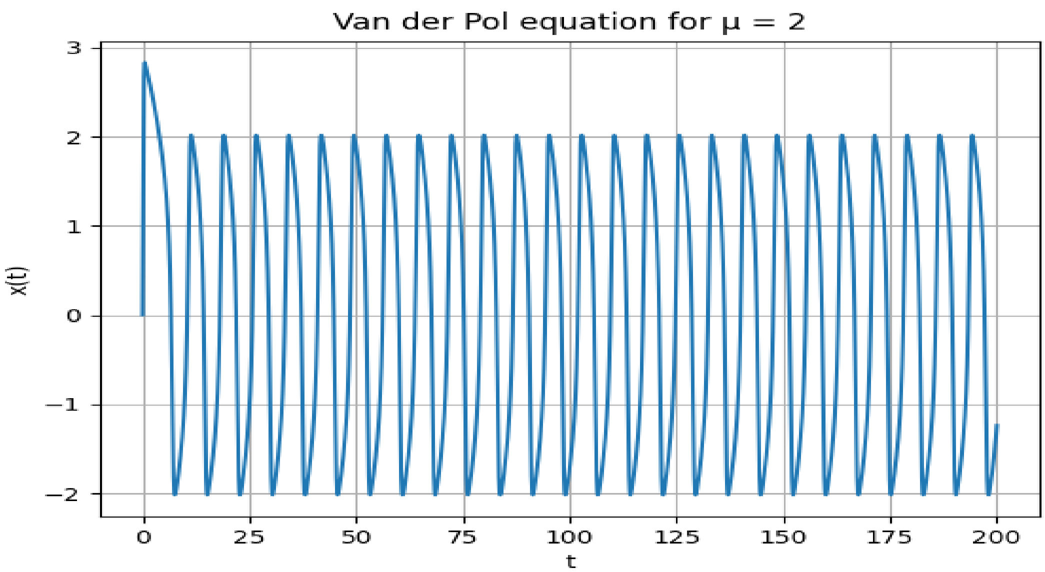
for h = 3, Polynomial equation is:
$5.0-2.39x+0.38x^2-0.02x^3$

Q3. Approach mentioned in comments

=>
Pendulum ODE has 2 single ordered differential equations which are solved using the forward Euler method. The animation is then created based on varied positions of the pendulum rod.



Q4. Approach mentioned in comments.
=> Solution of the Van der Pol equation is found using the forward Euler method. It exhibits a limit cycle.Time period of which at mu = 2 is found to be 7.7489



Time period of the limit cycle for mu = 2 is: 7.7489

Q5.Approach mentioned in comments.

=> The 3 body problem has 6 varying variables and thus 6 single ordered ODEs. The solution to the problem is found using the forward Euler method. An animation is created for different positions of the balls at varying time intervals.