AMS 595 Final Project

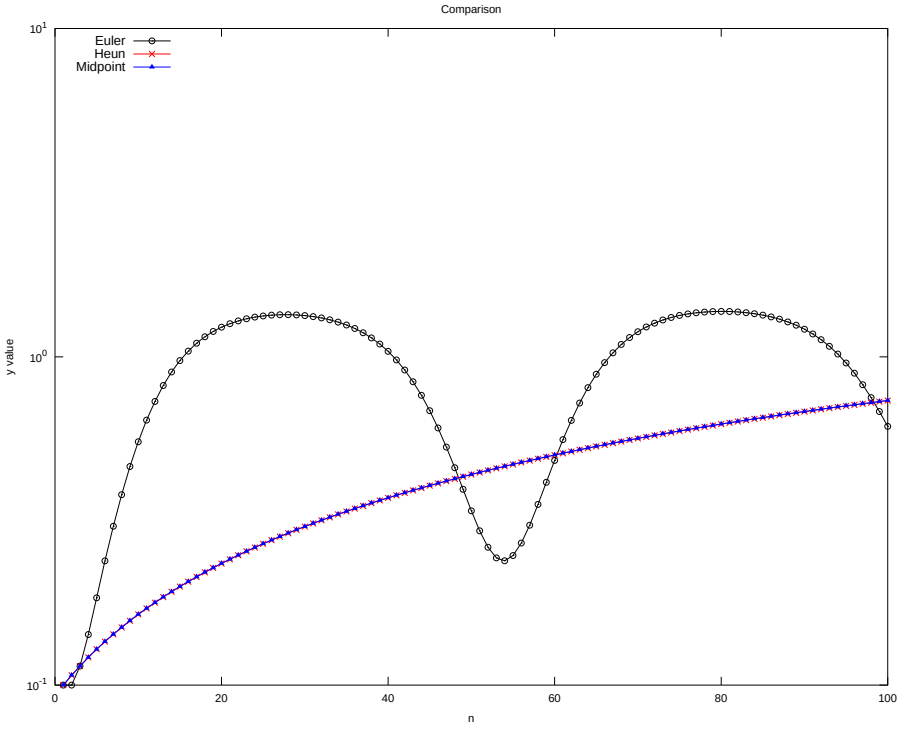
Anuradha Shrimali (107669298)

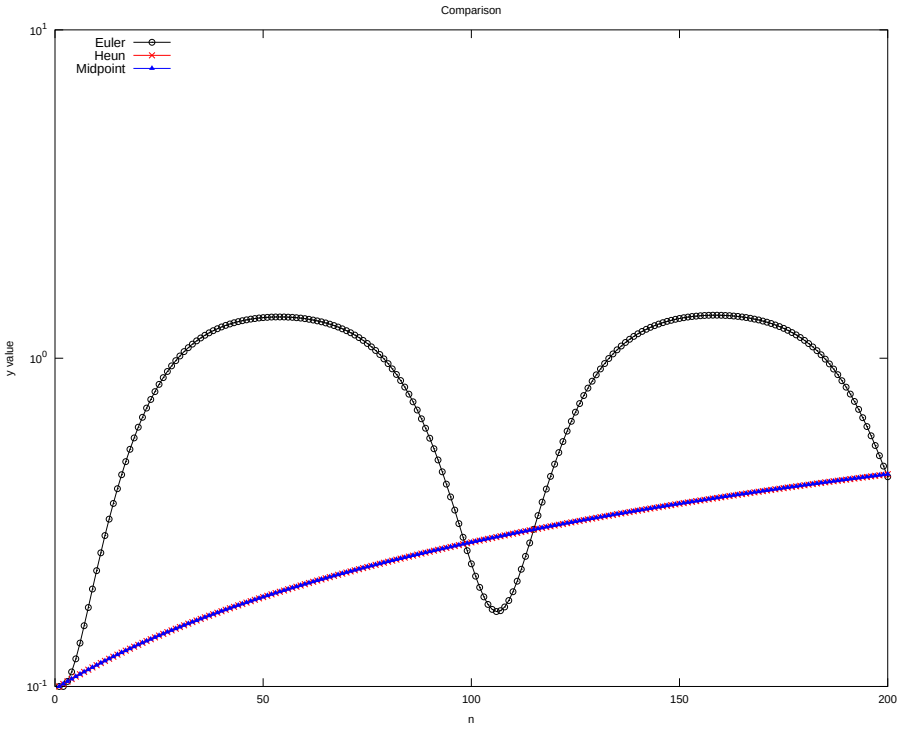
The following plots(n=100, 200, 400, 800, 1600) show $y(n)$ calculated by Euler(black), Heun(red) and Midpoint(blue) methods. We can see that Euler's method depicts the true solution as n increases from 100 to 800. However, Heun's and Midpoint method converge to 0 as n increases.

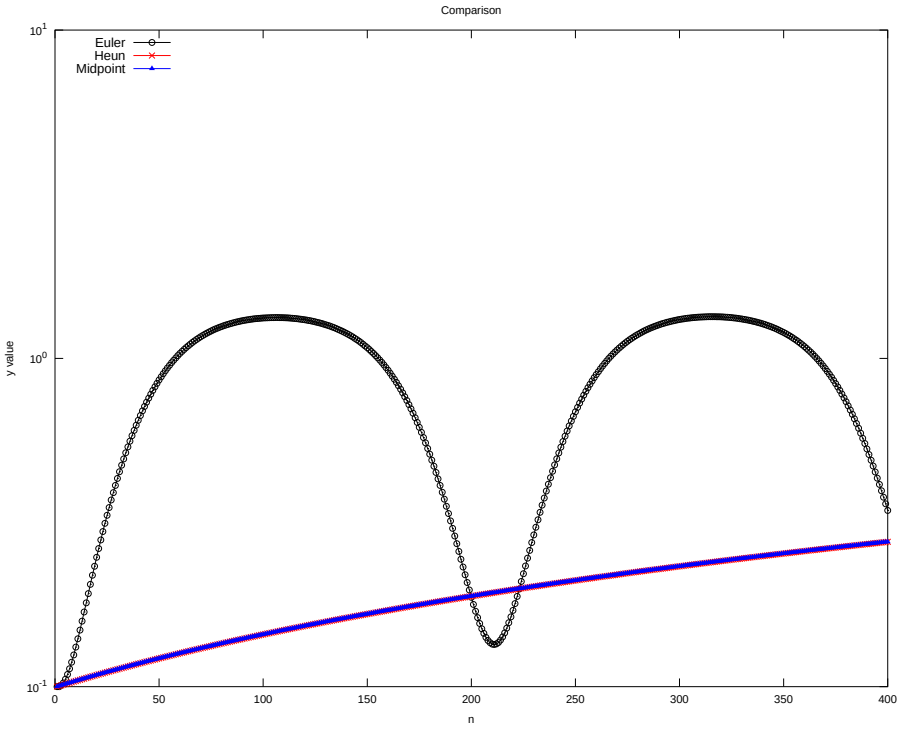
Also, Euler's method is the most accurate while Heun's and Midpoint methods are both comparable in accuracy.

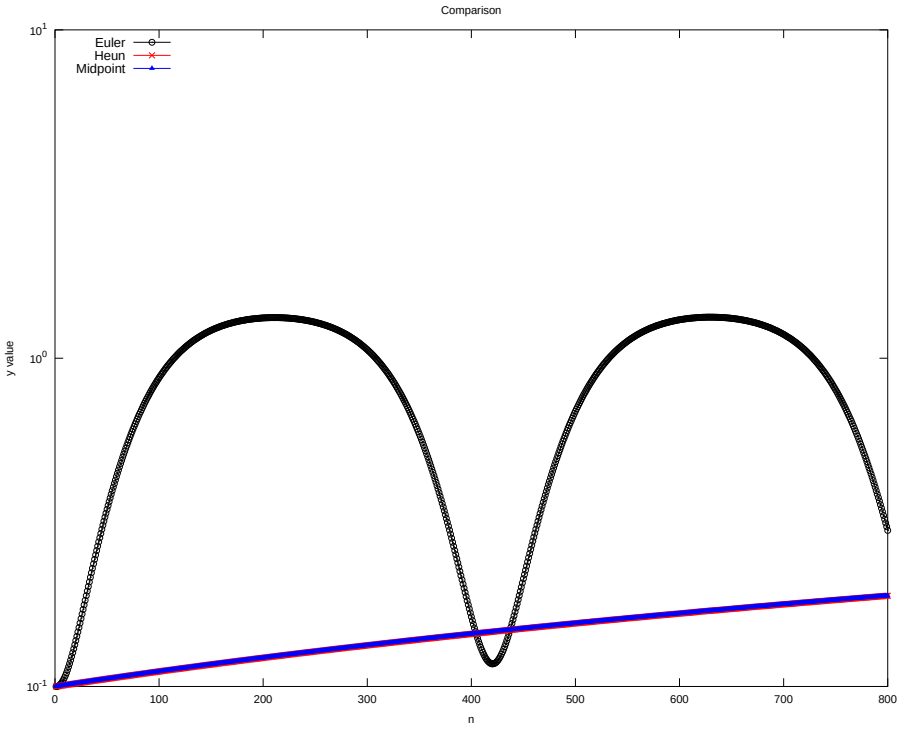
The code runs as follows:

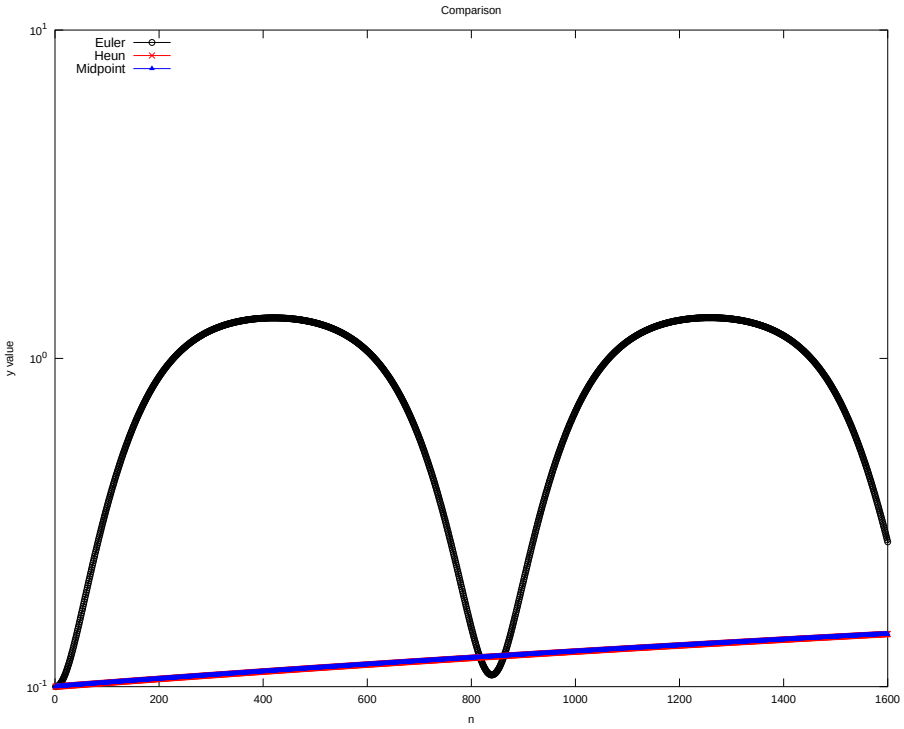
1. Running $final.c$ with a suitable(positive) n executes the three methods with $h = 12/n$.
2. The output values are written to $plotval2.m$.
3. Running $plot1.m$ generates 4 plots-one each for the three methods and one with all the three together.




Comparison
Euler
Heun
Midpoint
y value
n
10^1
10^0
10^{-1}
0
50
100
150
200


Comparison
Euler
Heun
Midpoint
y value
n
10^1
10^0
10^{-1}
0
50
100
150
200
250
300
350
400


Comparison
Euler
Heun
Midpoint
y value
n
10^1
10^0
10^{-1}
0
100
200
300
400
500
600
700
800


Comparison
Euler
Heun
Midpoint
y value
n
10^1
10^0
10^{-1}
0
200
400
600
800
1000
1200
1400
1600