Q_3_Post_Processing

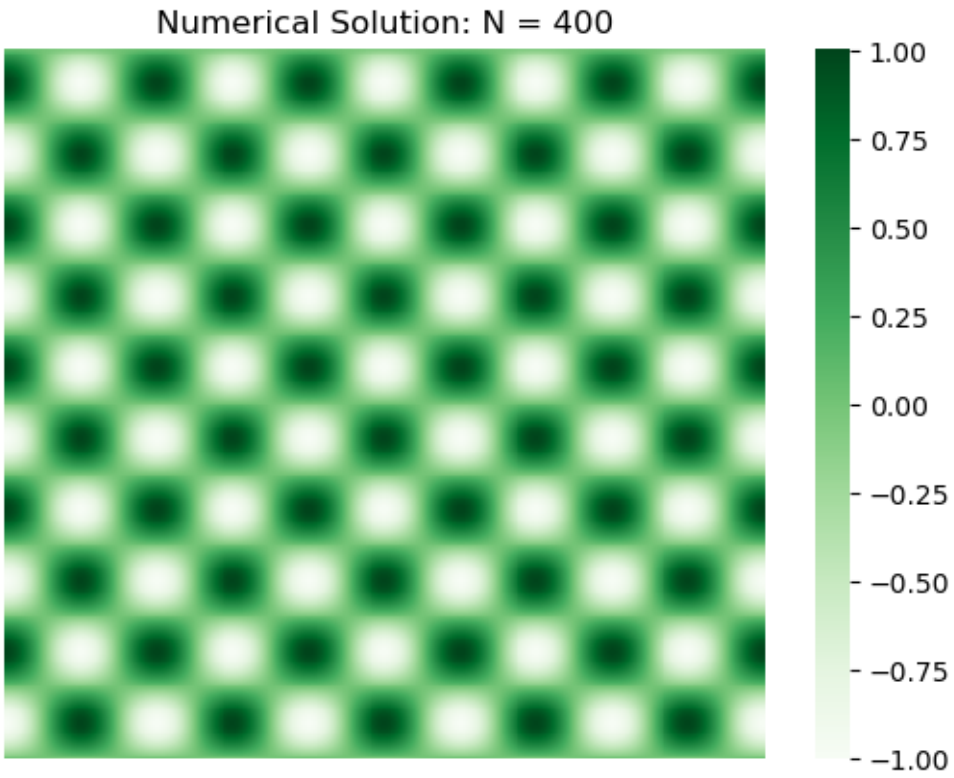
February 27, 2023

[1]:
```
import numpy as np;
import matplotlib.pyplot as plt;
import seaborn as sns;
import pandas as pd;
```

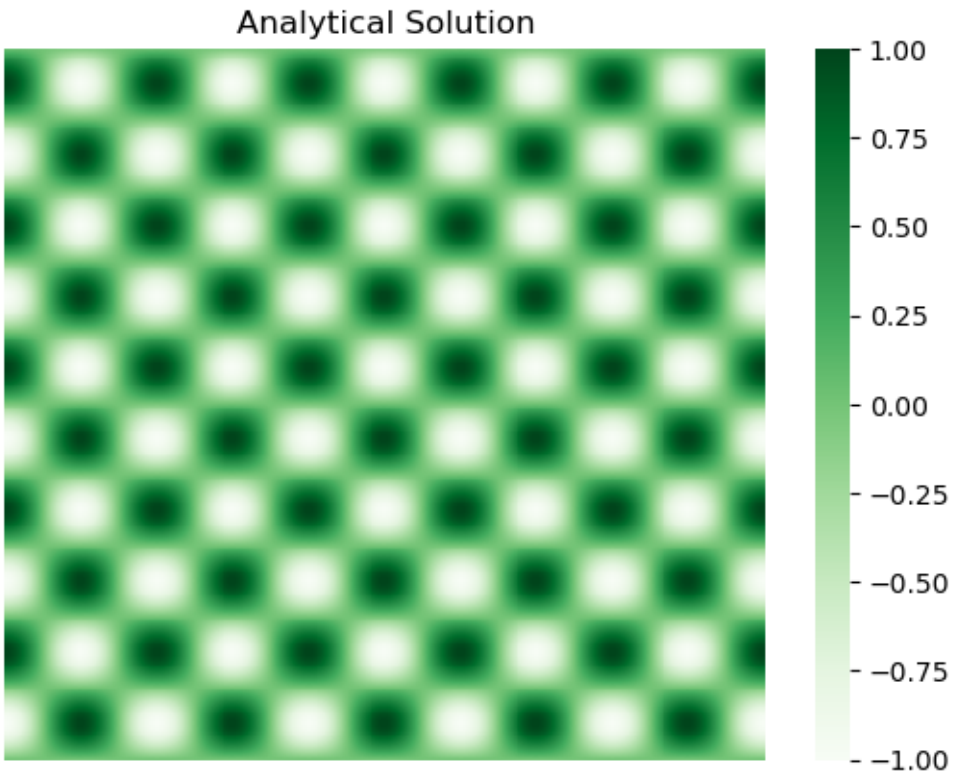
[2]:
```
Numerical = pd.read_csv("Q_3_Numerical_Solution_400_.csv").to_numpy()
```

[3]:
```
Analytical = pd.read_csv("Q_3_Analytical_Solution_400_.csv").to_numpy()
```

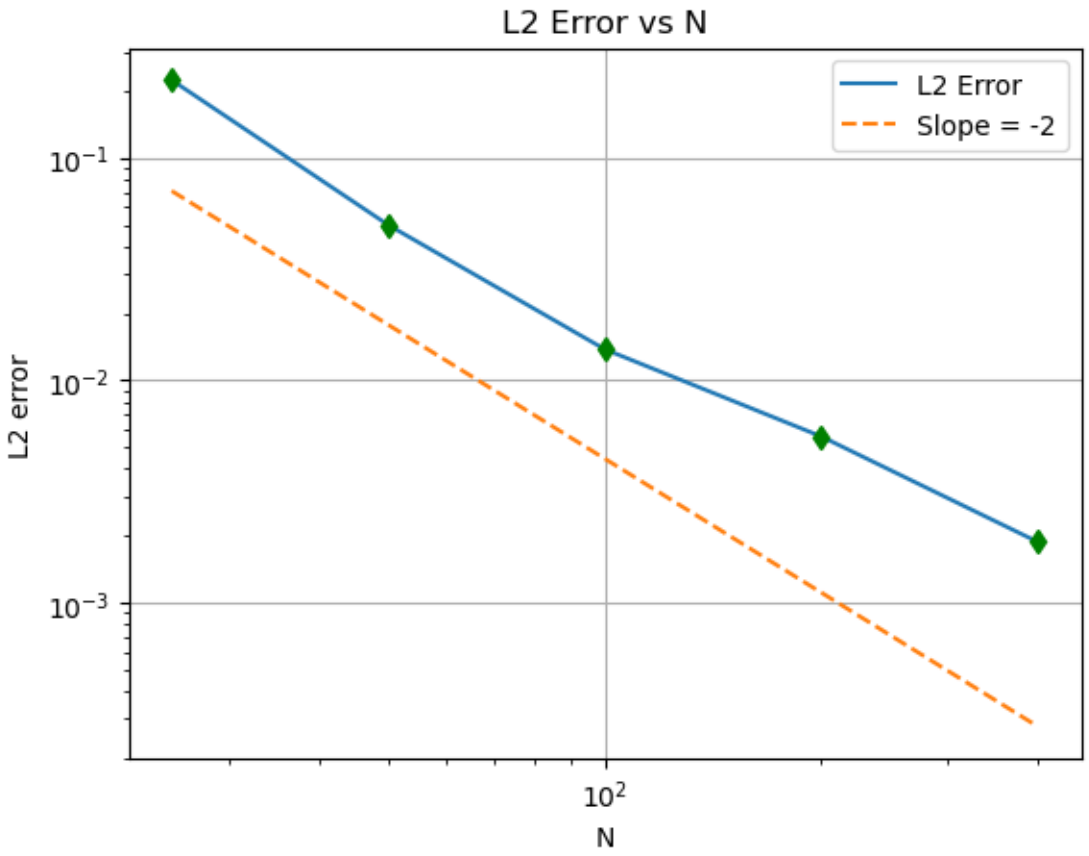
[4]:
```
ax = sns.heatmap(Numerical,cmap='Greens')
x_ticks = np.linspace(0,1,10)
y_ticks = np.linspace(0,1,10)
plt.xticks([],[])
plt.yticks([],[])
plt.title("Numerical Solution: N = 400")
plt.show()
```



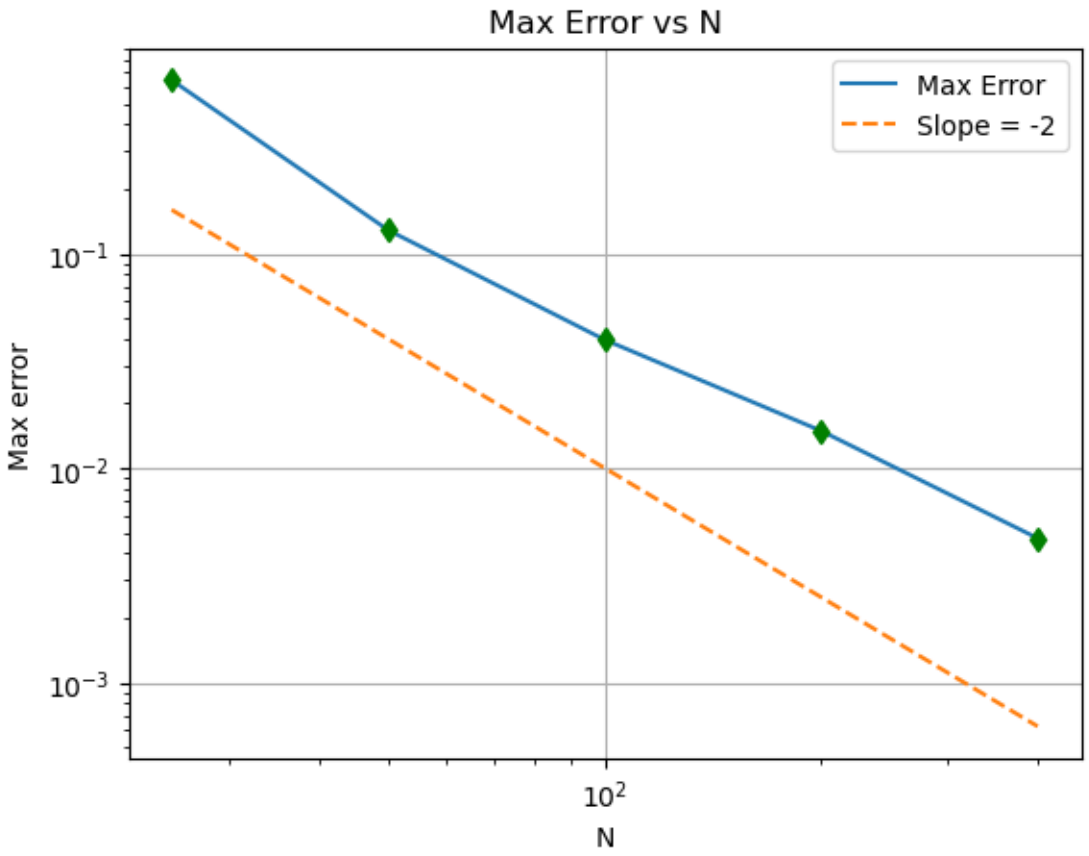
[5]:
```
ax = sns.heatmap(Analytical,cmap='Greens')
x_ticks = np.linspace(0,1,10)
y_ticks = np.linspace(0,1,10)
plt.xticks([],[])
plt.yticks([],[])
plt.title("Analytical Solution")
plt.show()
```



[6]:
```
fig = plt.figure()
N_num = [25.0,50.0,100.0,200.0,400.0];
L2_Error = pd.read_csv("Q_3_L2_Error.csv", delimiter = ",",header=None).
 ↪to_numpy()
plt.loglog(N_num,L2_Error)
plt.plot(N_num,(0.15*np.array(N_num))**(-2),"--")
plt.plot(N_num,L2_Error,"gd")
plt.legend(["L2 Error","Slope = -2"])
plt.xlabel("N")
plt.ylabel("L2 error")
#plt.xticks(ticks=N_num,labels=N_s)
plt.grid()
plt.title("L2 Error vs N")
plt.show()
fig.savefig("Q_1_a_L2_Error_vs_N.png",dpi = 500, bbox_inches="tight")
```



[7]:
```
fig = plt.figure()
N_num = [25.0,50.0,100.0,200.0,400.0];
Max_Error = pd.read_csv("Q_3_max_error.csv", delimiter = ",",header=None).
 ↪to_numpy()
plt.loglog(N_num,Max_Error)
plt.plot(N_num,(0.1*np.array(N_num))**(-2),"--")
plt.plot(N_num,Max_Error,"gd")
plt.legend(["Max Error","Slope = -2"])
plt.xlabel("N")
plt.ylabel("Max error")
#plt.xticks(ticks=N_num,labels=N_s)
plt.grid()
plt.title("Max Error vs N")
plt.show()
fig.savefig("Q_1_a_Max_Error_vs_N.png",dpi = 500, bbox_inches="tight")
```



1 So, the rate of convergence for both L2 Error and Max Error is approximately -2. As, it is almost parallel to a line with slope -2.