Homework 5

Laplace equation problem in 2D

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Python code and analysis

```
import numpy as np

h = 10**(-1)
x = np.arange(0,2+h,h)
y = np.arange(0,1+h,h)
V = np.zeros((len(x), len(y)))
# Boundary Conditions
V[np.where(x==2),:] = 1
V[np.where(x==0),:] = -1
V[:,np.where(y==0)] = -1
V[:,np.where(y==1)] = 1

V_new = np.copy(V)
steps = 1000
s = 0
while(s <= steps):
    s += 1
    for i in range(1,(len(x)-1)):
        for j in range(1,(len(y)-1)):
            V_new[i,j] = (1.0/4.0)*(V[i+1,j] + V[i-1,j] + V[i,j+1] + V[i,j-1])
            V = V_new
```

Plot

The color of the points give the value of the potential at the region.