HEAT CALCULATOR USING HEAT AND FINITE DIFFERENCE METHOD

importing libraries

In [59]:
```
import numpy as np
import matplotlib.pyplot as plt
from mpl_toolkits import mplot3d
```

declearing Variables

In [67]:
```
iteration_max = 100
length_x = 100
length_y = 100

colorinterpolation = 20
colourMap = plt.cm.viridis

delta = 1
alpha = 2
delta_t = (delta ** 2)/(4 * alpha)
gamma = (alpha * delta_t) / (delta ** 2)
```

Temperature Controling variables

In [68]:
```
top_temp = input("enter Temperature at TOP:")
bottom_temp =input("enter Temperature at BOTTOM:")
left_temp =input("enter Temperature at LEFT:")
right_temp =input("enter Temperature at RIGHT:")
#----initial temperature on body ---------
guess_temperature = 70
```

```
enter Temperature at TOP:100
enter Temperature at BOTTOM:0
enter Temperature at LEFT:30
enter Temperature at RIGHT:30
```

In [69]:
```
X, Y = np.meshgrid(np.arange(0,length_x), np.arange(0,length_y))

#------Initialize Temperature --------------
Temp = np.empty((length_x,length_y))

#------set initial temperature --------------
Temp.fill(guess_temperature)

#-------set boundoury temperature -------------
Temp[(length_y-1):, :] = top_temp
Temp[:1, :] = bottom_temp
Temp[:, (length_x-1):] = right_temp
Temp[:, :1] = left_temp
```

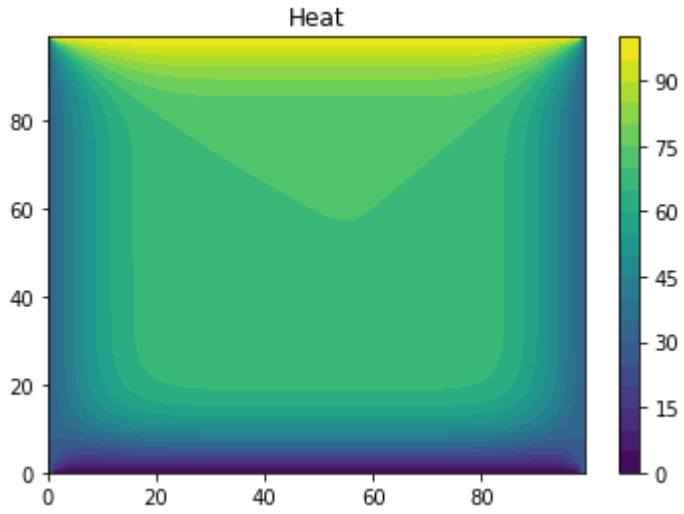
ITERATIONS

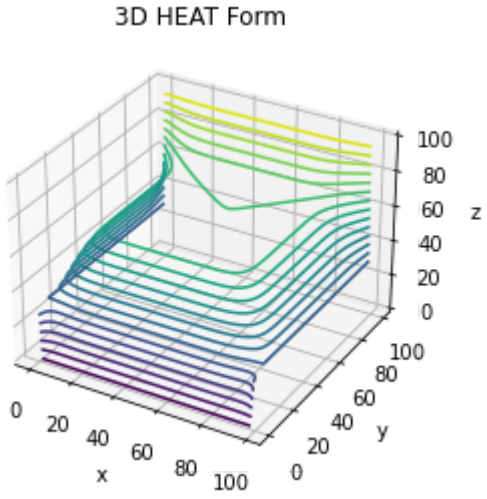
In [70]:
```
for iteration in range(0,iteration_max):
    for i in range(1, length_x-1,delta):
        for j in range(1, length_y-1,delta):
            Temp[i, j] = gamma * (Temp[i+1][j] + Temp[i-1][j] + Temp[i][j+1] + Te
```

Plotting GRAPH

In [71]:
```
plt.title("Heat")
plt.contourf(X, Y, Temp, colorinterpolation, cmap=colourMap)

plt.colorbar()
fig = plt.figure()
#---------3D MAP--------------
ax = plt.axes(projection='3d')
ax.contour3D(X, Y, Temp, colorinterpolation, cmap=colourMap)
ax.set_xlabel('x')
ax.set_ylabel('y')
ax.set_zlabel('z')
ax.set_title('3D HEAT Form')
plt.show()
```





In [ ]: