Math 578
Homework 2
Due: Sept 13 in class
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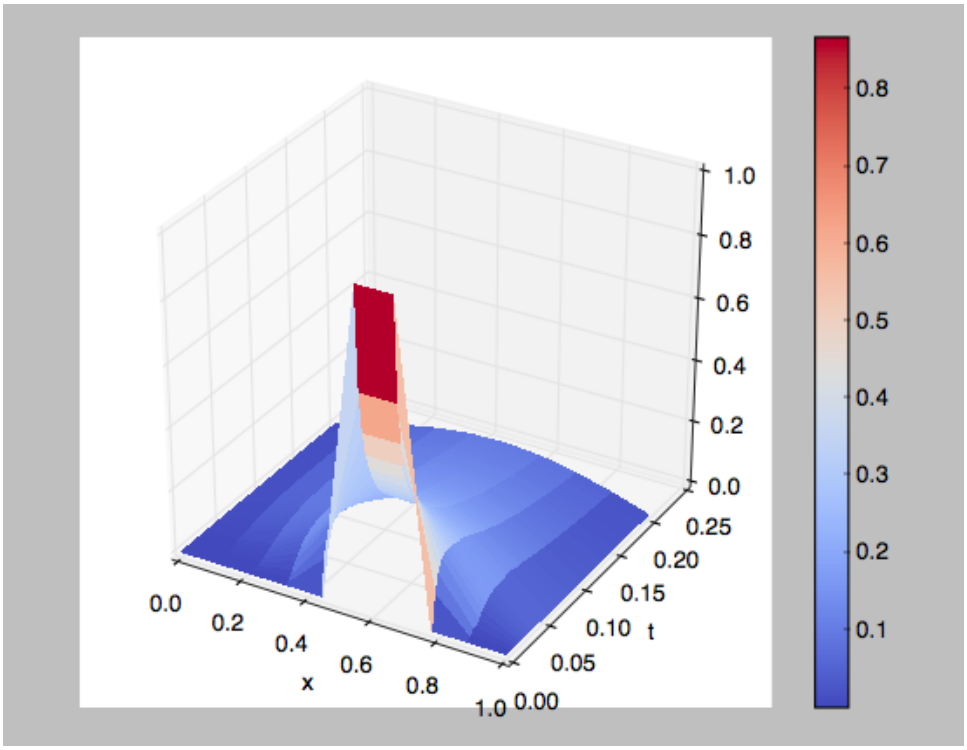
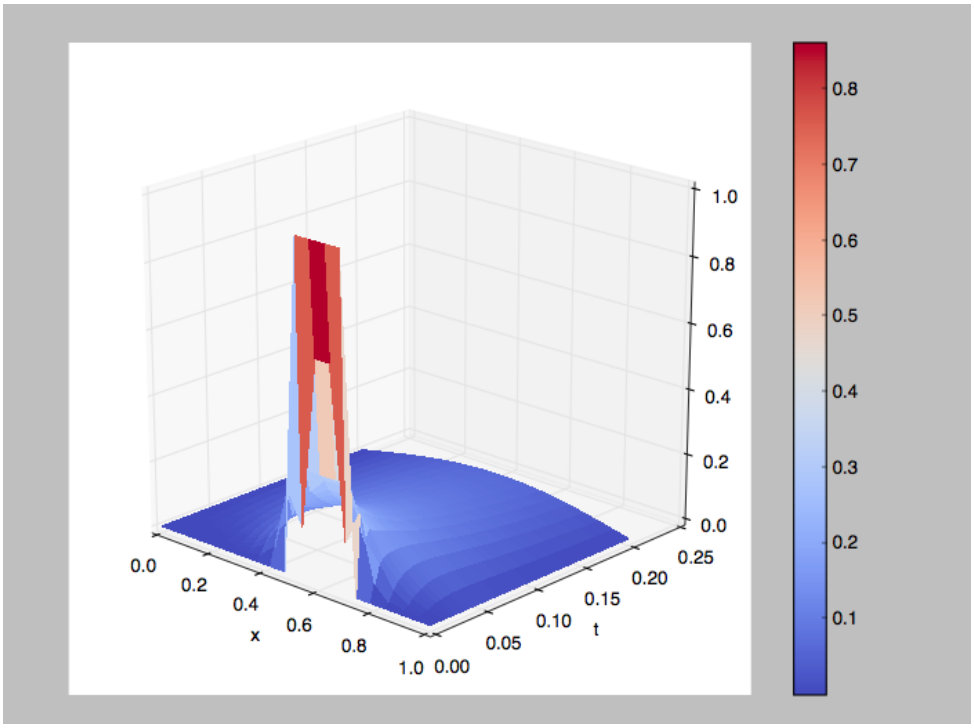
Plots and code: https://github.com/bphilipbar/math578 are also attached.

Problem 1)

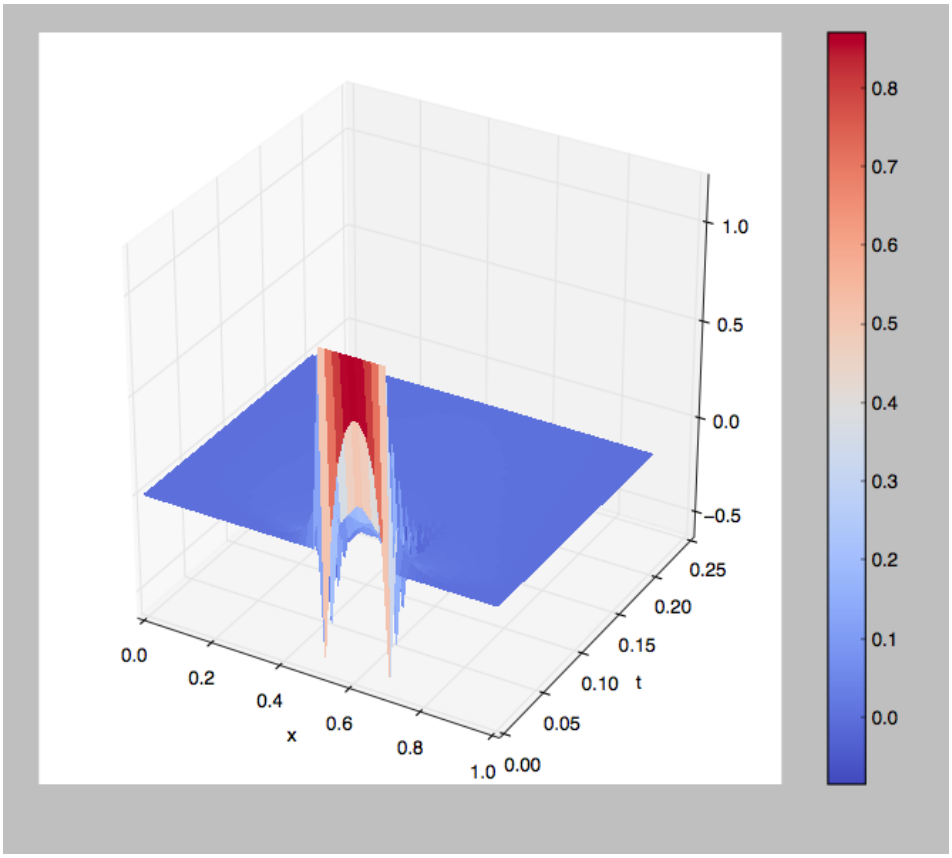
Plot1, Below: Nx=10, Nt=51



Plot2, Below: Nx=20, Nt=51



Plot3, Below: Nx=50, Nt=51



Problem 3)

3 Plots, Below:

Nx = 30 # NOT including the “fake” value on left
Ny = 30 # NOT including the “fake” value on bottom
Nt = 1000
tf = 1.01

figure 1: IC

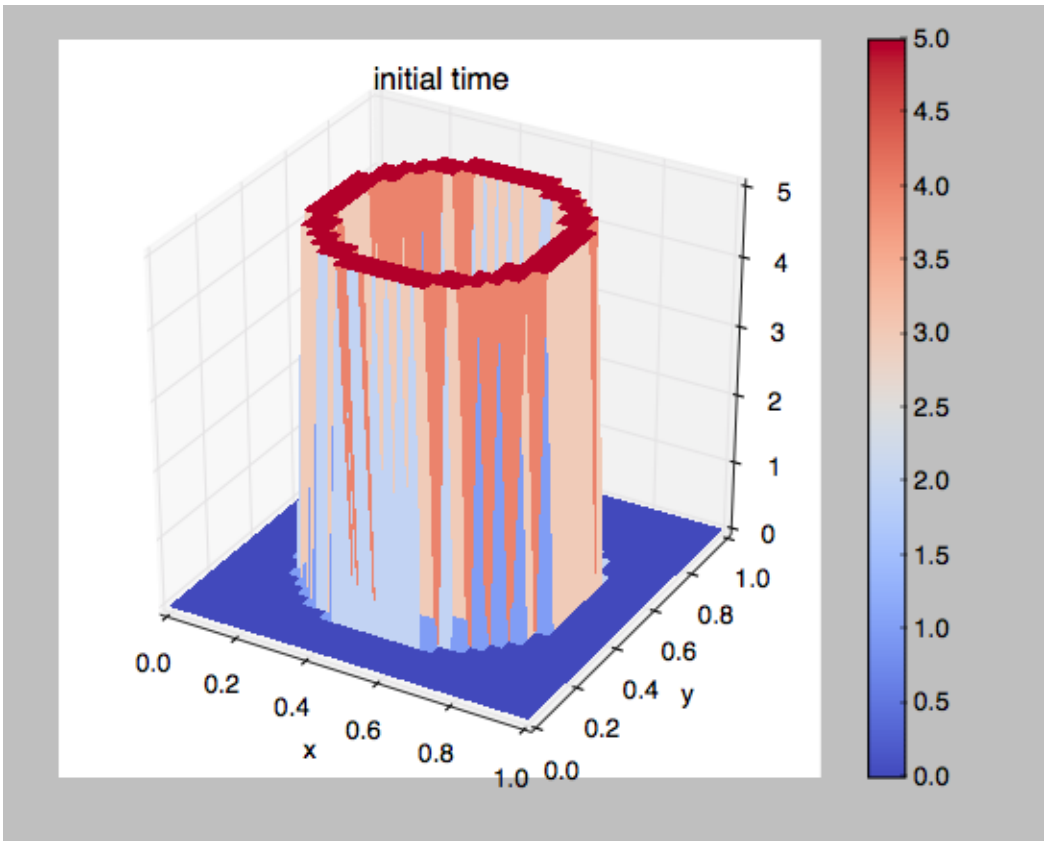


figure 2: t = .01

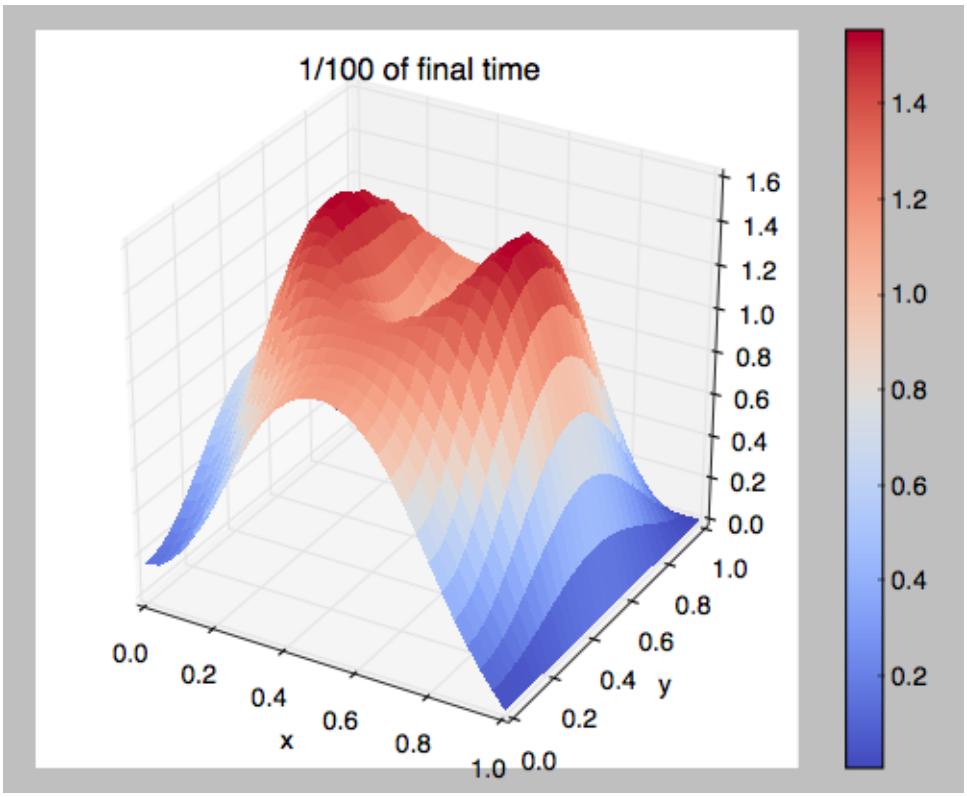
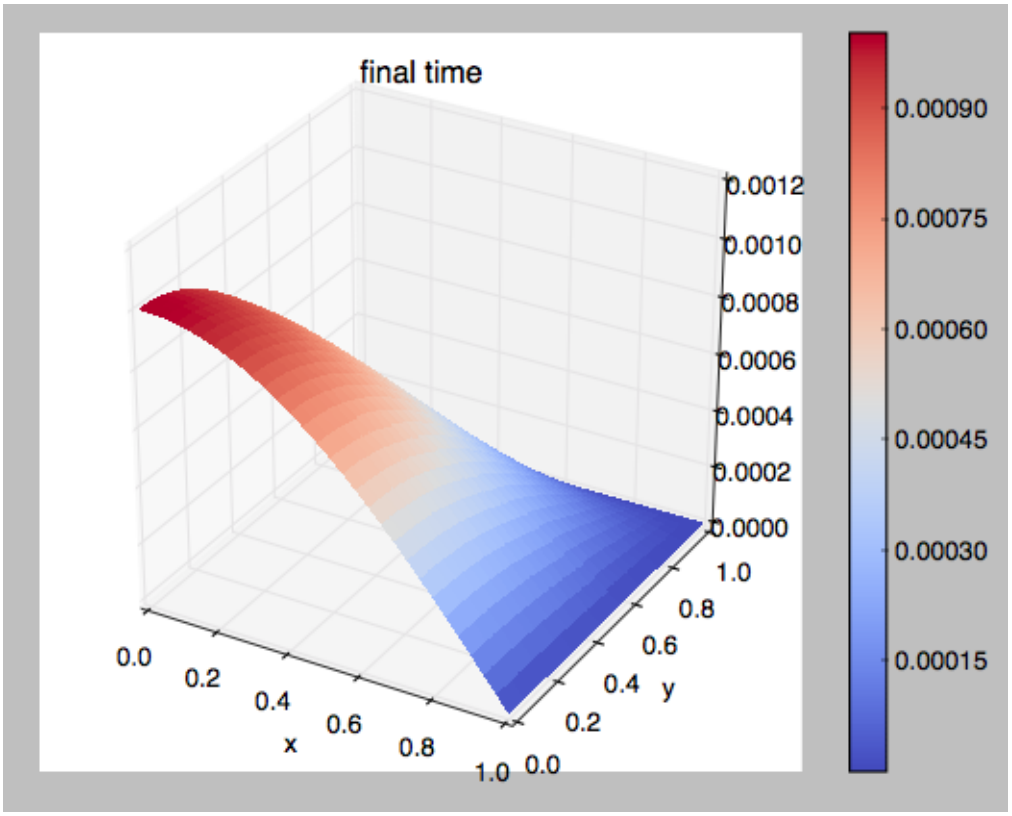


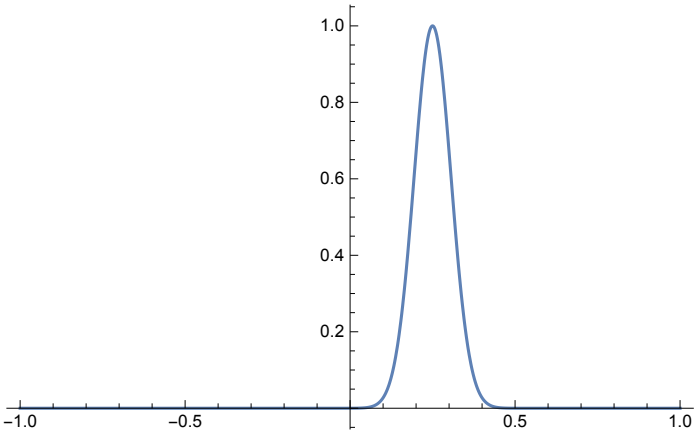
figure 3: t = 1.01



Problem 4)

In[1]:=
```
f = Exp[-10 (4 x - 1)^2];
Plot[f, {x, -1, 1}, PlotRange → All]
xSol = Solve[D[f, {x, 2}] == 0, x];
(*optimize f'*)N[xSol]
(*the second solution is clearly the one with the negative slope*)
t = Simplify[-1 / D[f, x] /. xSol]
N[t]
```

Out[2]=



Out[3]= $\{\{x \to 0.194098\}, \{x \to 0.305902\}\}$

Out[4]= $\left\{-\frac{\sqrt{\frac{e}{5}}}{8}, \frac{\sqrt{\frac{e}{5}}}{8}\right\}$

Out[5]= $\{-0.0921663, 0.0921663\}$