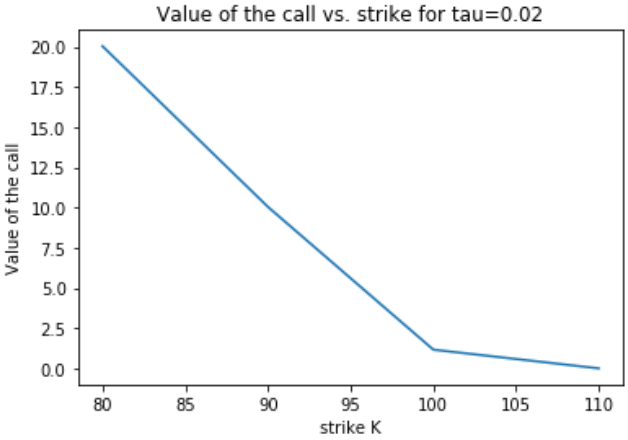
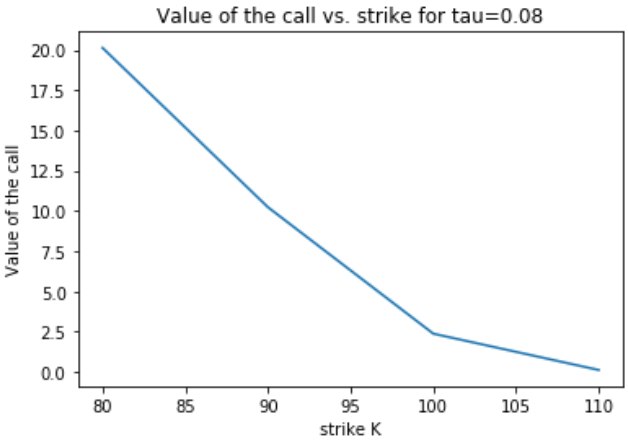
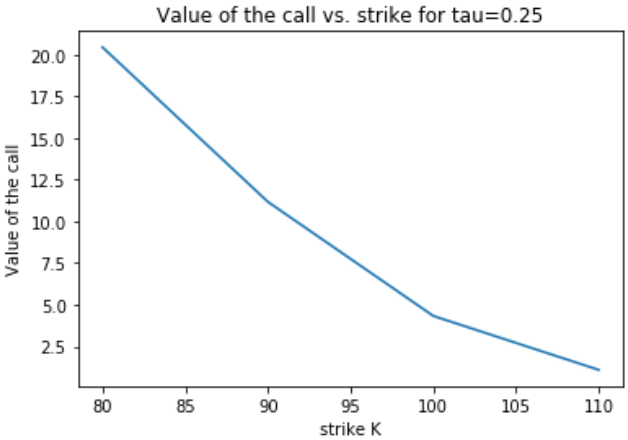
Exercise 2

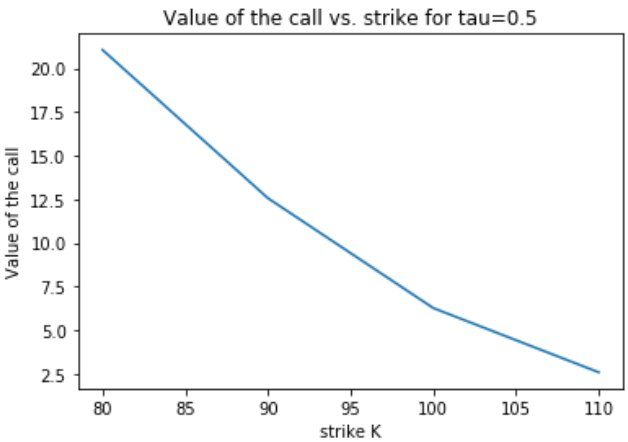
In [28]:
```
import numpy as np
from scipy.stats import norm
import matplotlib.pyplot as plt
```

In [29]:
```
def fact(n):
    return np.math.factorial(n)

iterations=40
lambd = 0.2
gamma = -0.08
sigma = 0.2
r = 0.04
T = [ 0.02,0.08,0.25,0.5 ]
S0 = 100
K = [80,90,100,110]


def N(x):
    return norm.cdf(x)

def C(K,T):
    res = 0
    for i in range(iterations):
        dplus_i =   ( np.log( S0 * (1+gamma)**i / K ) + (r+sigma**2/2)* T )
/ ( sigma * np.sqrt(T) )
        dminus_i =  ( np.log( S0 * (1+gamma)**i / K ) + (r-sigma**2/2)* T )
/ ( sigma * np.sqrt(T) )
        res += np.exp(-lambd * T ) * (lambd*T)**i / fact(i) *  \
                  ( S0 * (1+gamma)**i * N (dplus_i)  - np.exp(-r*T) * K * N(d
minus_i) )
    return res

Cv= np.vectorize(C)



for expiration in T:
    plt.figure()
    Y = Cv(K, expiration)
    plt.plot(K, Y)
    plt.xlabel('strike K')
    plt.ylabel('Value of the call')
    plt.title('Value of the call vs. strike for tau='+str(expiration))
    plt.show()
```


Value of the call vs. strike for tau=0.02
Value of the call
strike K
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
80
85
90
95
100
105
110


Value of the call vs. strike for tau=0.08
Value of the call
strike K
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
80
85
90
95
100
105
110


Value of the call vs. strike for tau=0.25
Value of the call
strike K
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
80
85
90
95
100
105
110


Value of the call vs. strike for tau=0.5
Value of the call
strike K
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
80
85
90
95
100
105
110