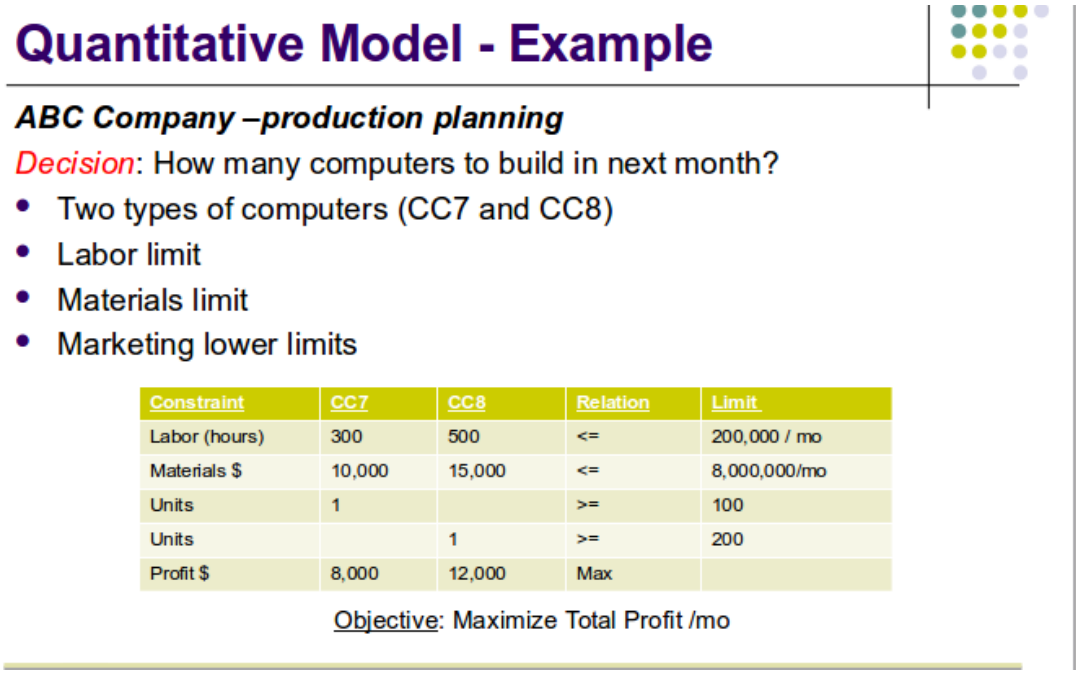
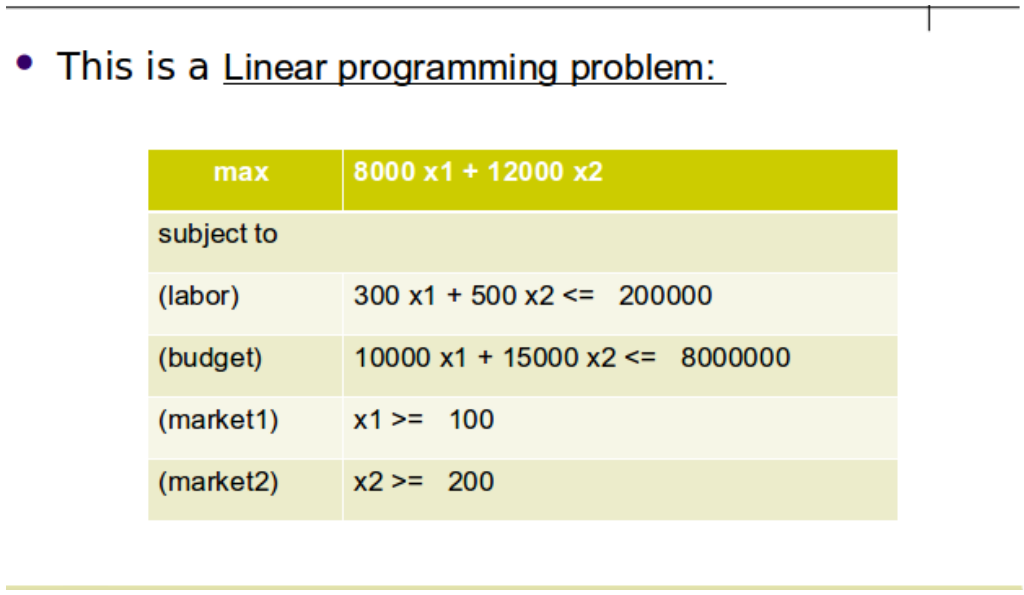
Maximizing a Function using Scipy

This Python Program will show how to use scipy and execute to maximize a function and find accurate values.

Problem Statement



Equations Formed



Program

In [8]:
```
"""
This Code is developed by Shamsheer Verma
Last Edited - 2/08/2018
"""
```

Out[8]:
```
'\nThis Code is developed by Shamsheer Verma\nLast Edited - 2/08/2018\n'
```

In [1]:
```
from scipy.optimize import minimize # Importing Library
```

In [2]:
```
def profits(x, sign=-1.0): # Defining a function called profits
    x1 = x[0] # Here x1 and x[0] is CC7
    x2 = x[1] # Here x2 and x[1] is CC8
    return sign*(8000*x1 + 12000*x2) # It is important to put sign as -1
because we are using minimize
                                     # function of scipy to maximize thi
s function

"""
In constraints it is important to note that I have put negative sign in
return function
for some constraints. This is because when there is an inequality equati
on the constraint
tends to automatically take >= sign instead of <=. To make sure it works
properly with labor
and budget inequality equation, I have put the negative sign.
"""

def constraint1(x):
    return (-3*x[0] - 5*x[1]+2000) # This is our first constraint for la
bor work.

def constraint2(x):
    return (-10*x[0] - 12*x[1]+8000) # This is our second constraint for
budget.

def constraint3(x):
    return (x[0]-100) # Third constraint for minimum number of CC7

def constraint4(x):
    return (x[1]-200) # Fourth constraint for minimum number of CC8
```

In [3]:
```
x0 = [100,200] # Initial Guess Values
```

In [4]:
```
# Making a dictionary of constraints and storing the result in a list.
con1 = {'type':'ineq', 'fun': constraint1}
con2 = {'type':'ineq', 'fun': constraint2}
con3 = {'type':'ineq', 'fun': constraint3}
con4 = {'type':'ineq', 'fun': constraint4}
cons = [con1, con2, con3, con4]
```

In [5]:
```
output = minimize(profits, x0, method='SLSQP', constraints=cons) # calli
ng the minimize function form scipy
print (output) # Printing the solution function
```

```
     fun: -5066673.710638682
     jac: array([ -8000., -12000.])
 message: 'Positive directional derivative for linesearch'
    nfev: 54
     nit: 10
    njev: 6
  status: 8
 success: False
       x: array([ 333.3339285 ,  200.00019022])
```

In [7]:
```
print (output.x) # These are the values for CC7 and CC8. Here 333 are CC
7 and 200 are CC8
```

```
[ 333.3339285   200.00019022]
```

Finish