

JUPYTER 활용법

과제:

www.github.com 에 계정을 만들고 프로젝트를 생성한 후 anaconda 로 설치한 Jupyter를 구동하여 URP-BS-formula 내용을 정리해 봅니다.

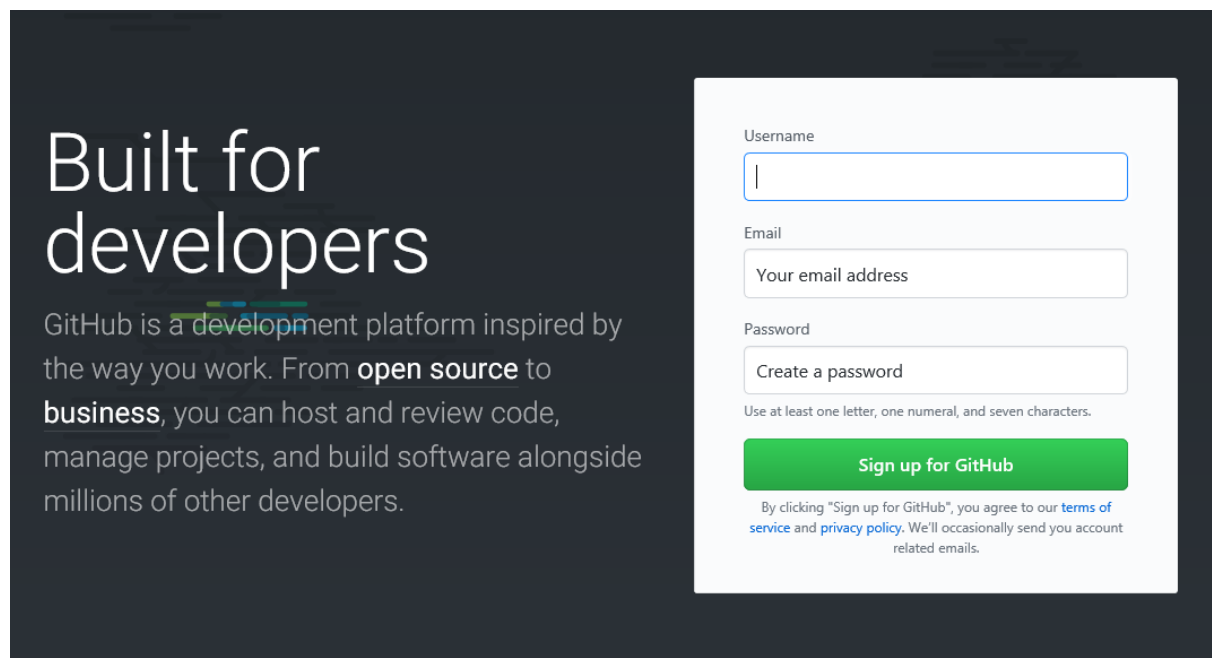
편한 username 으로 github 에 회원가입하고 URP-FinanceProject 라는 repository 를 개설합니다.

여기에 <https://github.com/aorc-group2/URP-FinanceProject> 에 주어진

BSformula_Haug.py 와 URP-BS-example.txt 를 Jupyter 를 통하여 URP-BS-example.ipynb 파일로 저장하고 BSformula_Haug.py 와 URP-BS-example.txt 그리고 URP-BS-example.ipynb 파일을 업로드 해서 위 <https://github.com/aorc-group2/URP-FinanceProject> 와 같은 프로젝트를 각자의 유저 계정에 만들어 봅니다.

프로젝트 완성 후 github 주소를 내게 이메일로 답장 주세요.

1. Github 에서 계정을 만듭니다. Username 은 각자 편한 이름을 고르고 이메일을 확인하면 sign up 됩니다.



Built for
developers

GitHub is a development platform inspired by the way you work. From **open source** to **business**, you can host and review code, manage projects, and build software alongside millions of other developers.

Username

Email

Password

Use at least one letter, one numeral, and seven characters.

[Sign up for GitHub](#)

By clicking "Sign up for GitHub", you agree to our [terms of service](#) and [privacy policy](#). We'll occasionally send you account related emails.

제 계정에는 URPproject 와 URP-FinanceProject 가 있습니다.

The screenshot shows the GitHub homepage. At the top, there's a navigation bar with the GitHub logo, a search bar, and links for Pull requests, Issues, Marketplace, and Gist. Below the navigation bar, a large banner encourages users to "Learn Git and GitHub without any code!" by following a "Hello World" guide. Two buttons, "Read the guide" and "Start a project", are prominently displayed. To the right, a section titled "Your repositories" shows a list of repositories, including "URP-FinanceProject" and "URPproject". A "New repository" button is also visible.

아래와 같은 repository를 각자의 github.com/"username"/URP-FinanceProject 로 만드는데 과제입니다.

The screenshot displays the GitHub repository page for "aorc-group2 / URP-FinanceProject". The repository is under the "master" branch and has 4 commits, 1 branch, 0 releases, and 1 contributor. The repository description is "Undergraduate Research Program at AORC SKKU". The file list shows four files: "BSformula_Haug.py", "README.md", "URP-BS-example.ipynb", and "URP-BS-example.txt". The "README.md" file is expanded, showing the title "URP-FinanceProject" and the subtitle "Undergraduate Research Program at AORC SKKU".

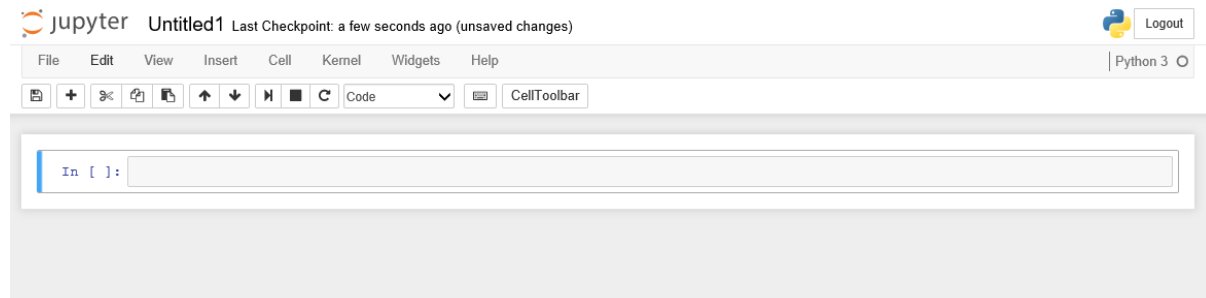
이제 URP-BS-example.ipynb (ipython notebook format) 을 만들어 봅시다.

Anaconda를 통해서 Jupyter 를 실행합니다.

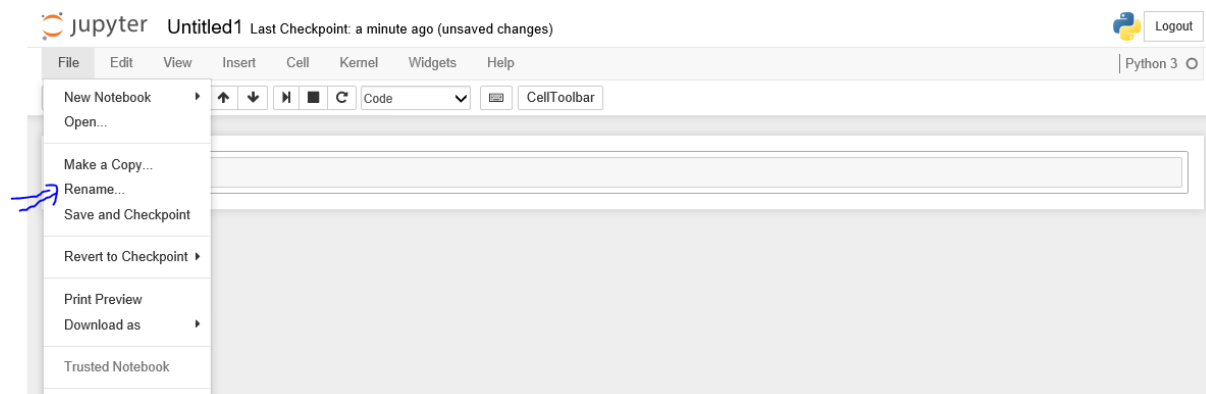
New menu 에서 python3 notebook 을 새로 만듭니다.



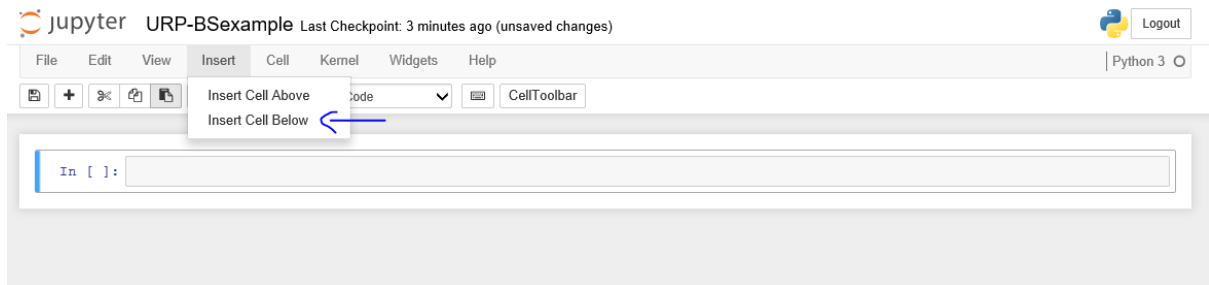
아래처럼 새 노트북이 untitled 로 만들어집니다.



원하는 이름으로 바꿉시다. 우리는 URP-BS-example

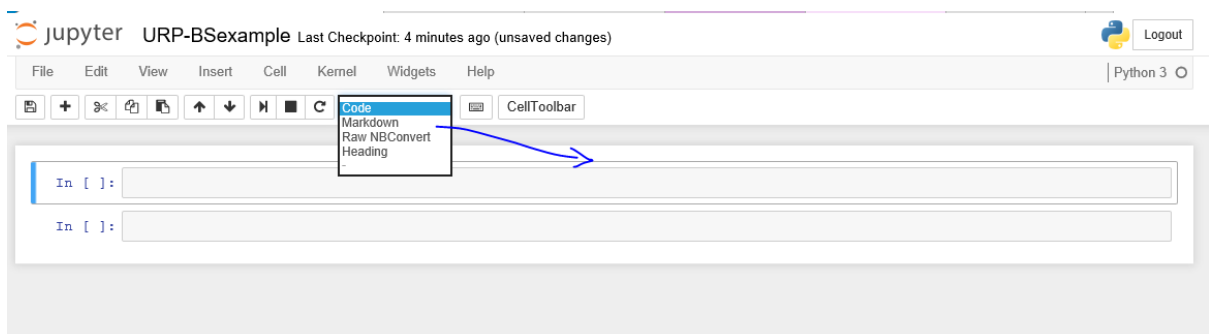


내용 한 줄과 실행내역이 필요해서 한 줄을 추가합니다. (간단히 return 누르면 한 줄 생깁니다 사실...)



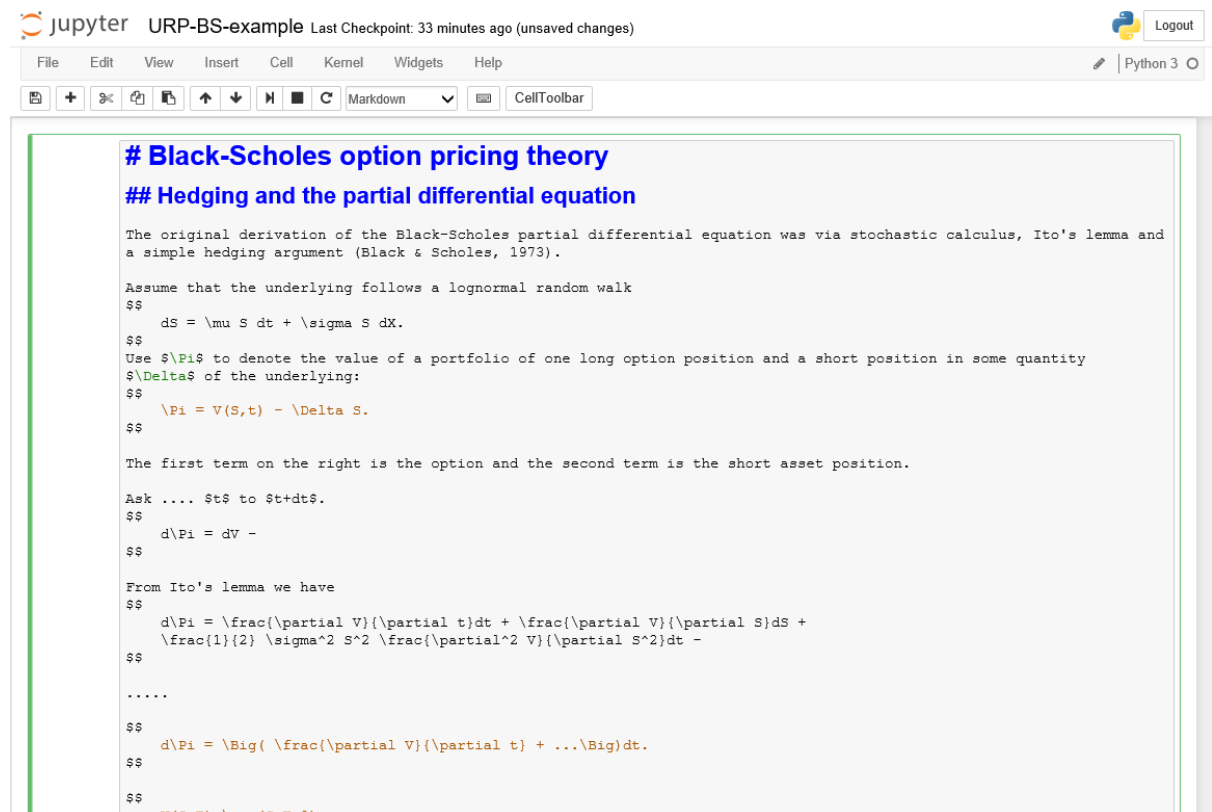
Jupyter cell 은 크게code 와 markdown 으로 설정할 수 있습니다. 우리는 code 에서는 python 프로그램을 실행하고, markdown 에서는 latex 을 활용해서 내용을 정리합니다.

윗 줄의 형식을 markdown 으로 변경합니다.



Markdown 으로 변경된 cell 에 URP-BS-example.txt 의 내용을 붙여 넣습니다. Txt 파일은

<https://github.com/aorc-group2/URP-FinanceProject> 에서 찾을 수 있습니다.



Jupyter URP-BS-example Last Checkpoint: 33 minutes ago (unsaved changes)

File Edit View Insert Cell Kernel Widgets Help Python 3

CellToolbar

```
# Black-Scholes option pricing theory
## Hedging and the partial differential equation

The original derivation of the Black-Scholes partial differential equation was via stochastic calculus, Ito's lemma and a simple hedging argument (Black & Scholes, 1973).

Assume that the underlying follows a lognormal random walk

$$dS = \mu S dt + \sigma S dX.$$

Use  $\Pi$  to denote the value of a portfolio of one long option position and a short position in some quantity  $\Delta$  of the underlying:

$$\Pi = V(S, t) - \Delta S.$$


The first term on the right is the option and the second term is the short asset position.

Ask ....  $t$  to  $t+dt$ .

$$d\Pi = dV -$$


From Ito's lemma we have

$$d\Pi = \frac{\partial V}{\partial t} dt + \frac{\partial V}{\partial S} dS + \frac{1}{2} \sigma^2 S^2 \frac{\partial^2 V}{\partial S^2} dt -$$

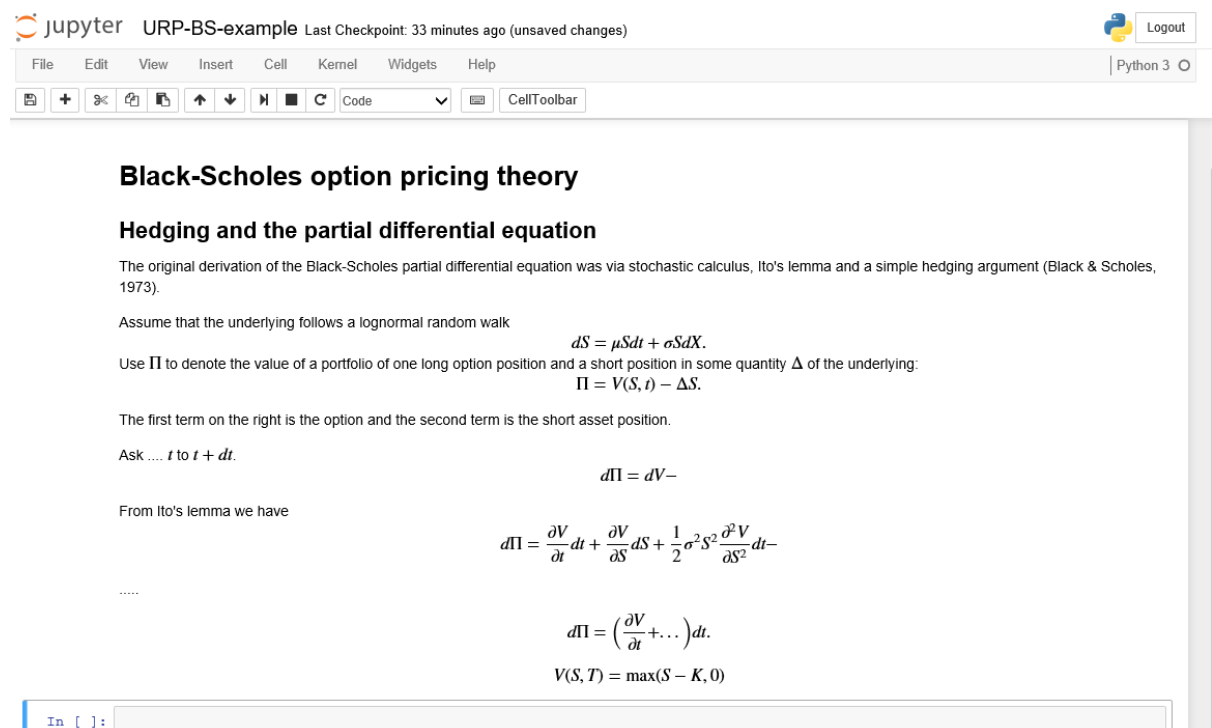
.....

$$d\Pi = \left( \frac{\partial V}{\partial t} + \dots \right) dt.$$


$$V(S, T) = \max(S - K, 0)$$

```

이제 cell 안에서 shift + enter 키를 누르면 latex 형식이 수식으로 바뀝니다.



Jupyter URP-BS-example Last Checkpoint: 33 minutes ago (unsaved changes)

File Edit View Insert Cell Kernel Widgets Help Python 3

CellToolbar

Black-Scholes option pricing theory

Hedging and the partial differential equation

The original derivation of the Black-Scholes partial differential equation was via stochastic calculus, Ito's lemma and a simple hedging argument (Black & Scholes, 1973).

Assume that the underlying follows a lognormal random walk

$$dS = \mu S dt + \sigma S dX.$$

Use Π to denote the value of a portfolio of one long option position and a short position in some quantity Δ of the underlying:

$$\Pi = V(S, t) - \Delta S.$$

The first term on the right is the option and the second term is the short asset position.

Ask t to $t + dt$.

$$d\Pi = dV -$$

From Ito's lemma we have

$$d\Pi = \frac{\partial V}{\partial t} dt + \frac{\partial V}{\partial S} dS + \frac{1}{2} \sigma^2 S^2 \frac{\partial^2 V}{\partial S^2} dt -$$

.....

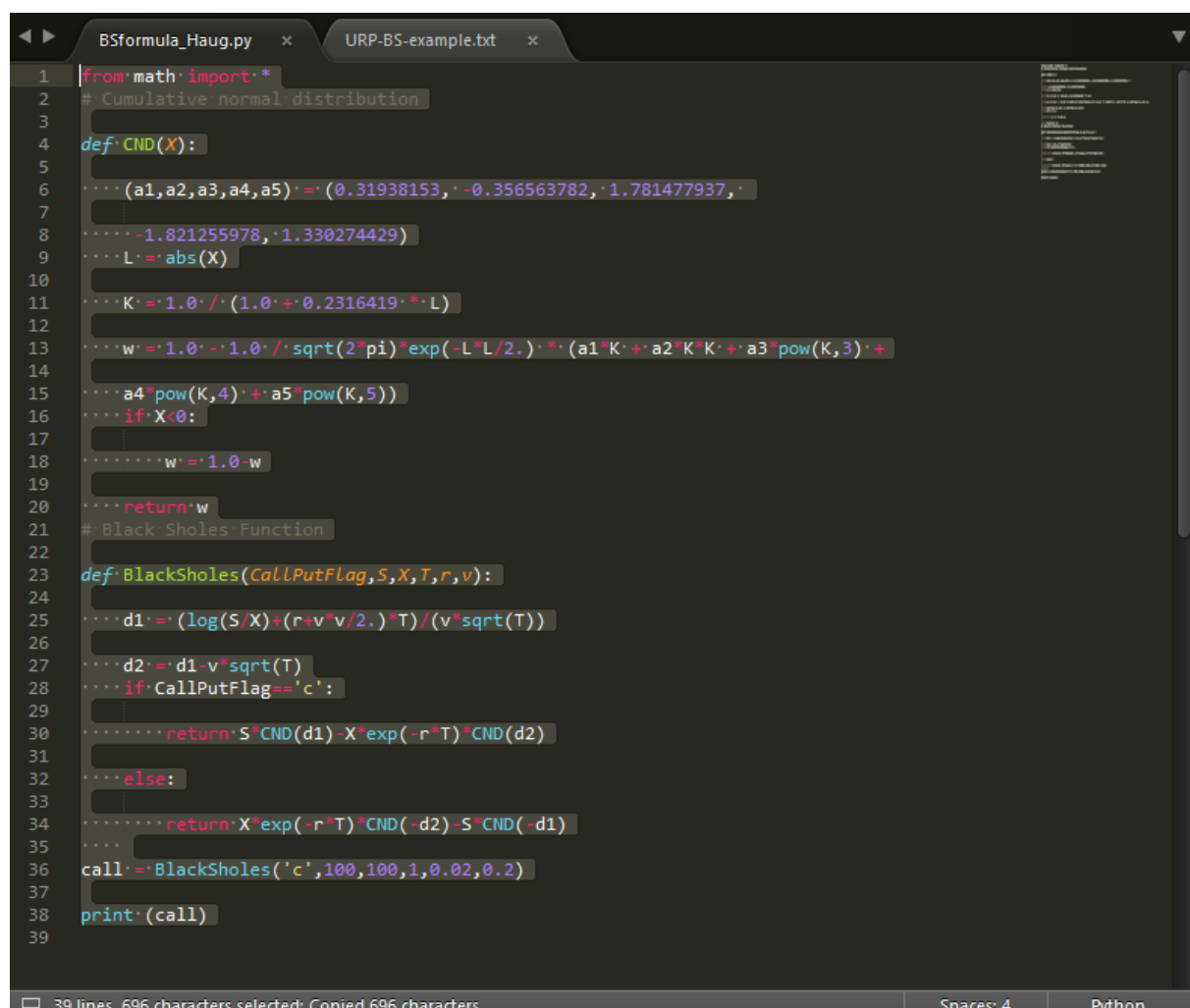
$$d\Pi = \left(\frac{\partial V}{\partial t} + \dots \right) dt.$$
$$V(S, T) = \max(S - K, 0)$$

In []:

앞에서 markdown cell 에서 shift + enter 로 입력한 내용을 다시 편집하고 싶으면 cell 을 더블클릭하면 editor 모드로 전환됩니다.

이제 BSformula_Haug.py 를 두번째 줄 code cell 에 붙여 넣을 차례입니다.

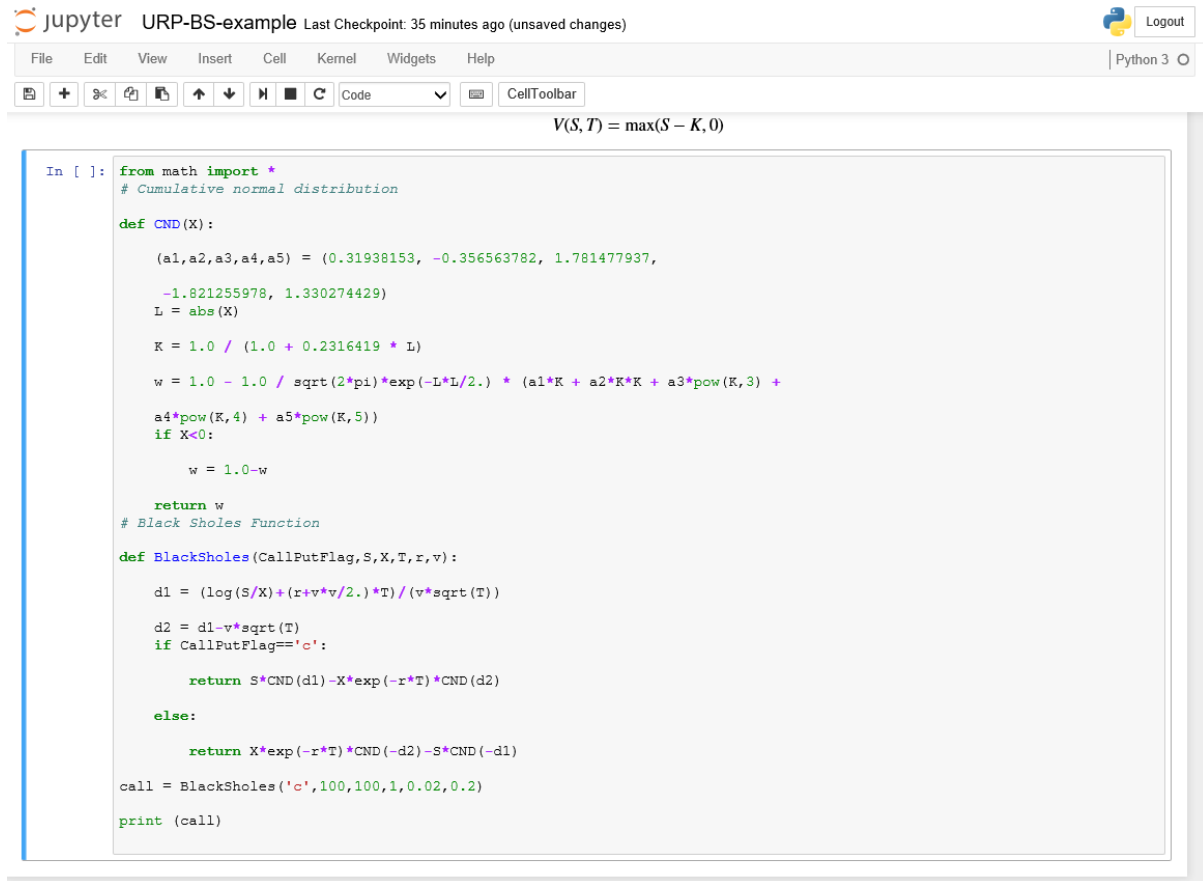
저는 sublime text 라는 text editor 를 사용합니다. 코딩할때 많이 사용하는 편리한 editor 로 쉽게 다운받을 수 있습니다.



```
1 from math import *
2 # Cumulative normal distribution
3
4 def CND(X):
5     (a1,a2,a3,a4,a5) = (0.31938153, -0.356563782, 1.781477937,
6     -1.821255978, 1.330274429)
7     L = abs(X)
8     K = 1.0 / (1.0 + 0.2316419 * L)
9     w = 1.0 - 1.0 / sqrt(2*pi) * exp(-L*L/2.) * (a1*K + a2*K*K + a3*pow(K,3) +
10     a4*pow(K,4) + a5*pow(K,5))
11     if X<0:
12         w = 1.0 - w
13     return w
14
15 # Black Scholes Function
16
17 def BlackSholes(CallPutFlag,S,X,T,r,v):
18     d1 = (log(S/X) + (r+v*v/2.)*T) / (v*sqrt(T))
19     d2 = d1 - v*sqrt(T)
20     if CallPutFlag=='c':
21         return S*CND(d1) - X*exp(-r*T)*CND(d2)
22     else:
23         return X*exp(-r*T)*CND(-d2) - S*CND(-d1)
24
25 call = BlackSholes('c',100,100,1,0.02,0.2)
26
27 print(call)
```

39 lines, 696 characters selected. Copied 696 characters. Spaces: 4 Python

두번째 cell 은 code 형식으로 남아있습니다. 여기에 py 코드를 붙여 넣었습니다.



The image shows a Jupyter Notebook interface with the title "URP-BS-example". The top bar includes the Jupyter logo, the title, and a "Last Checkpoint: 35 minutes ago (unsaved changes)" message. On the right, there is a "Logout" button. Below the title bar is a menu bar with "File", "Edit", "View", "Insert", "Cell", "Kernel", "Widgets", and "Help". A toolbar with various icons is located below the menu bar. The main area displays a code cell with the following Python code:

```
In [ ]: from math import *
# Cumulative normal distribution

def CND(X):

    (a1,a2,a3,a4,a5) = (0.31938153, -0.356563782, 1.781477937,
        -1.821255978, 1.330274429)
    L = abs(X)

    K = 1.0 / (1.0 + 0.2316419 * L)

    w = 1.0 - 1.0 / sqrt(2*pi)*exp(-L*L/2.) * (a1*K + a2*K*K + a3*pow(K,3) +
        a4*pow(K,4) + a5*pow(K,5))
    if X<0:
        w = 1.0-w

    return w
# Black Sholes Function

def BlackSholes(CallPutFlag,S,X,T,r,v):

    d1 = (log(S/X)+(r+v*v/2.)*T)/(v*sqrt(T))

    d2 = d1-v*sqrt(T)
    if CallPutFlag=='c':

        return S*CND(d1)-X*exp(-r*T)*CND(d2)

    else:

        return X*exp(-r*T)*CND(-d2)-S*CND(-d1)

call = BlackSholes('c',100,100,1,0.02,0.2)

print (call)
```

Cell 안에서 shift+enter 를 누르면 실행됩니다.



This image is a close-up of the code cell from the previous image, showing the execution of the Black-Scholes function. The code is the same as in the previous image, but the output of the `print (call)` statement is visible at the bottom of the cell:

```
8.916035060662303
```

Below the code cell, the input prompt "In []:" is visible, indicating that the code has been executed.

결과가 수치로 나왔습니다.

이제 이 결과를 ipynb (ipython notebook)으로 다운받습니다.

로컬에 다운받은 결과를 github 에 올리면 됩니다. (github 생성한 URP-.... Repository 로)

Github 에서 ipynb 파일을 더블 클릭하면 jupyter 에서 보던 대로 볼 수 있습니다.

