King Saud University | **Actu 483**

Department of Mathematics | **Final Exam**

Second Semester 1442 H | **Duration: 3 Hours**

18/04/2021 – 6/9/1441H

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Sequence Number: 438104503
Section:

Note*: *The exam consists of 4 pages

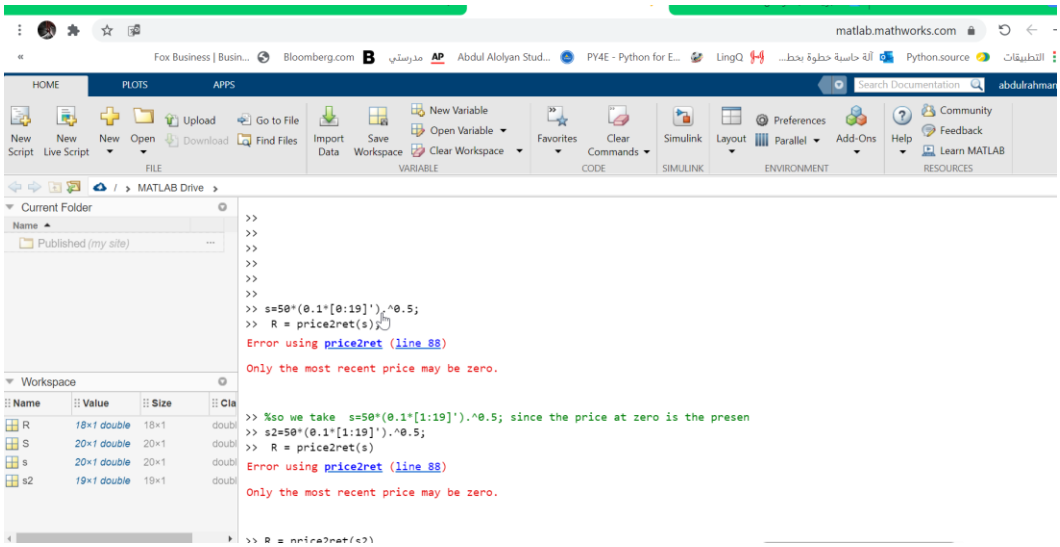
Question	Mark
Exercise 1	3
Exercise 2	3
Exercise 3	5
Exercise 4	3
Exercise 5	6
Total	

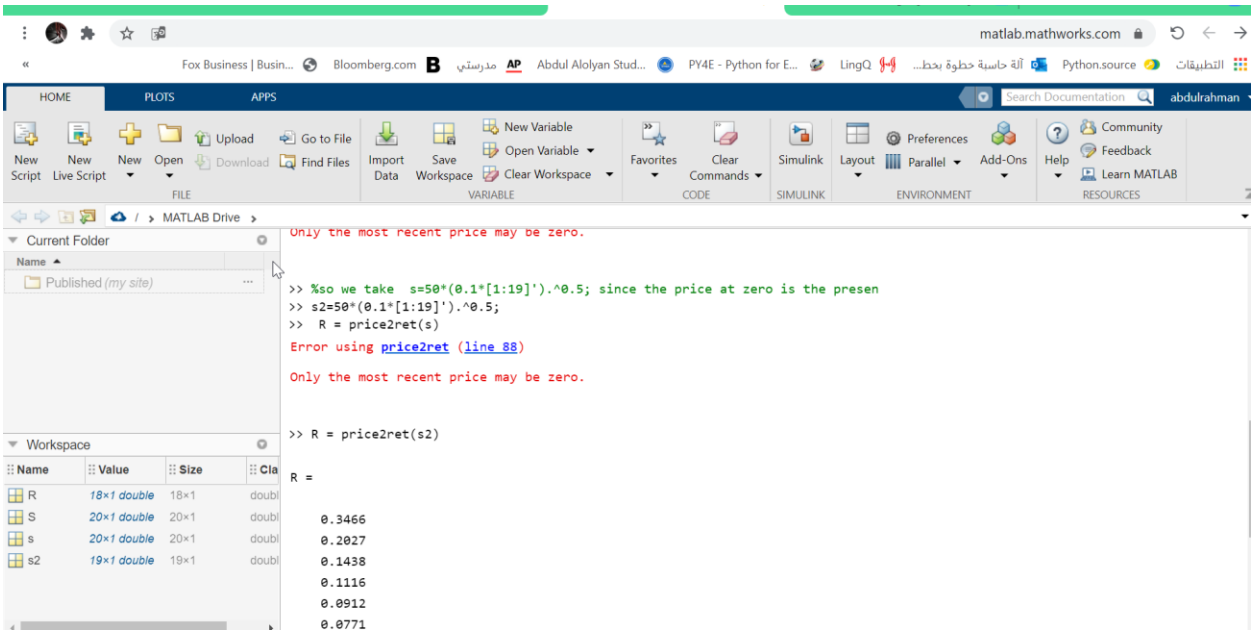
Instruction for exam ACTU 483:

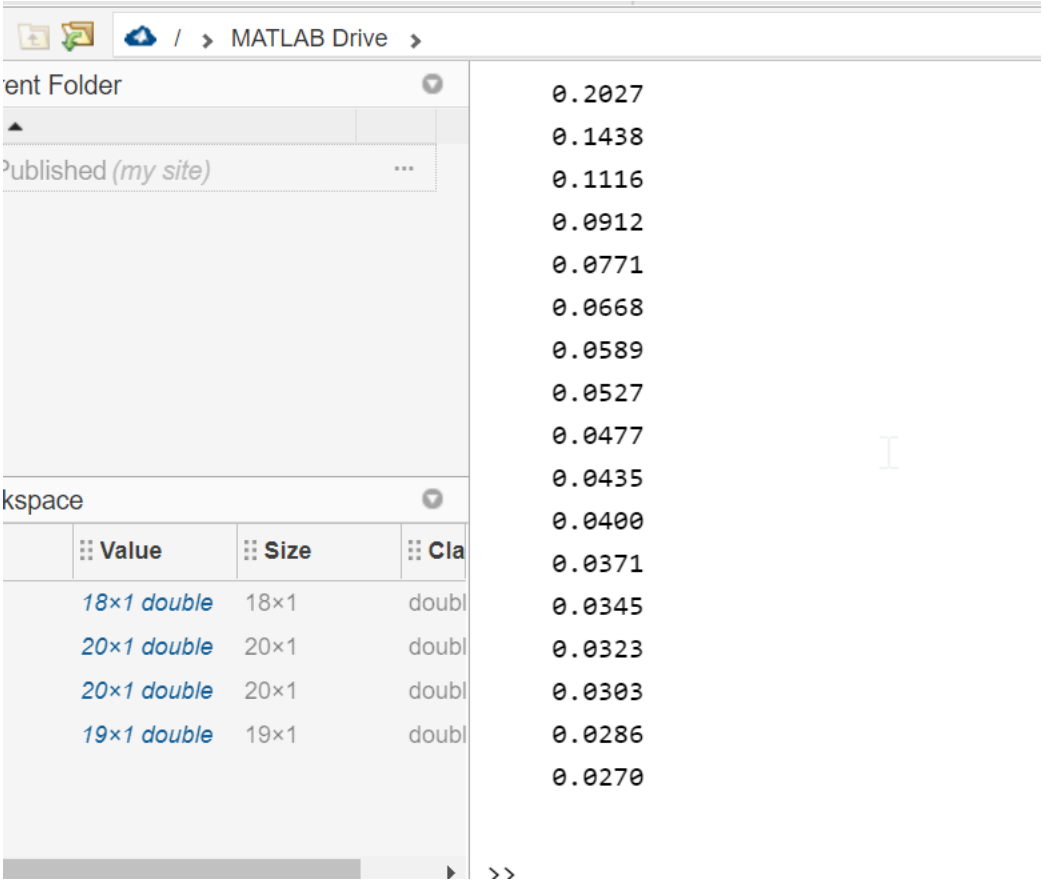
1- The duration of the exam is 2:45 hours
2- 15 minutes after the exam , You need to print screen for your answers and copy it in the word file
3- Save your file and send it to my e-mail : aalmualem@ksu.edu.sa

Exercise 1: [3]

1) Create stock price process continuously compounded at 10 percent. By using the function
   S= 50 $\sqrt[2]{0.10\,t}$, $t \in [0,19]$
2) Convert price series to a 10 percent return series.




matlab.mathworks.com
HOME
PLOTS
APPS
abdulrahman
MATLAB Drive
Current Folder
Published (my site)
Only the most recent price may be zero.
>> %so we take s=50*(0.1*[1:19]').^0.5; since the price at zero is the presen
>> s2=50*(0.1*[1:19]').^0.5;
>> R = price2ret(s)
Error using price2ret (line 88)
Only the most recent price may be zero.
>> R = price2ret(s2)
R =
0.3466
0.2027
0.1438
0.1116
0.0912
0.0771
Workspace
Name
Value
Size
R 18×1 double 18×1
S 20×1 double 20×1
s 20×1 double 20×1
s2 19×1 double 19×1


MATLAB Drive
ent Folder
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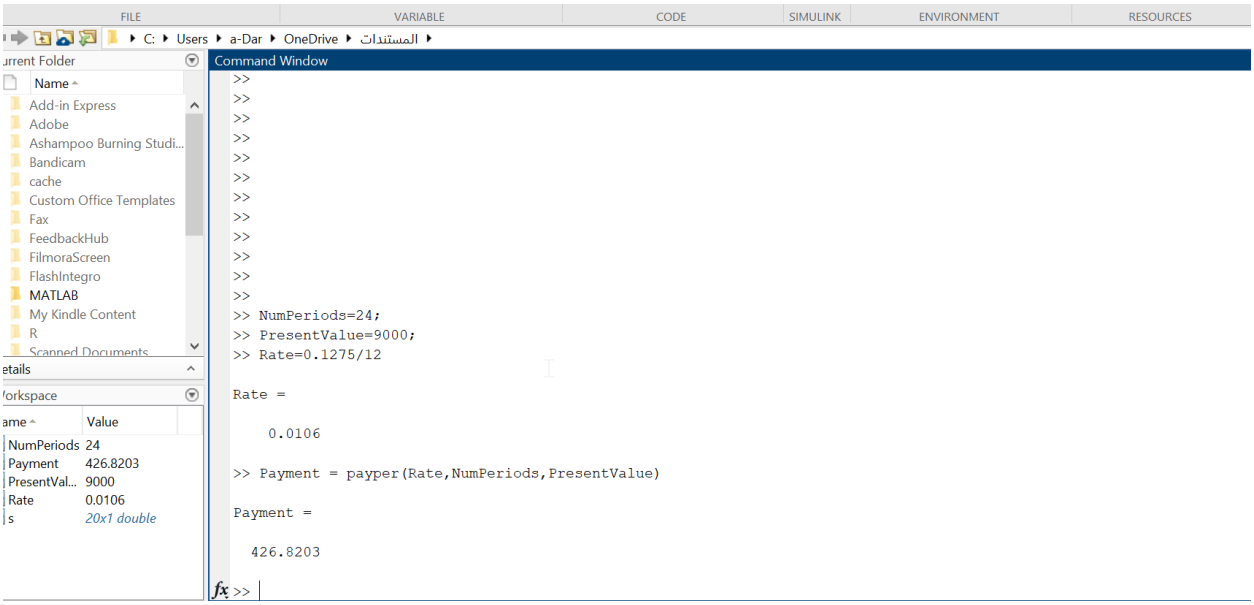
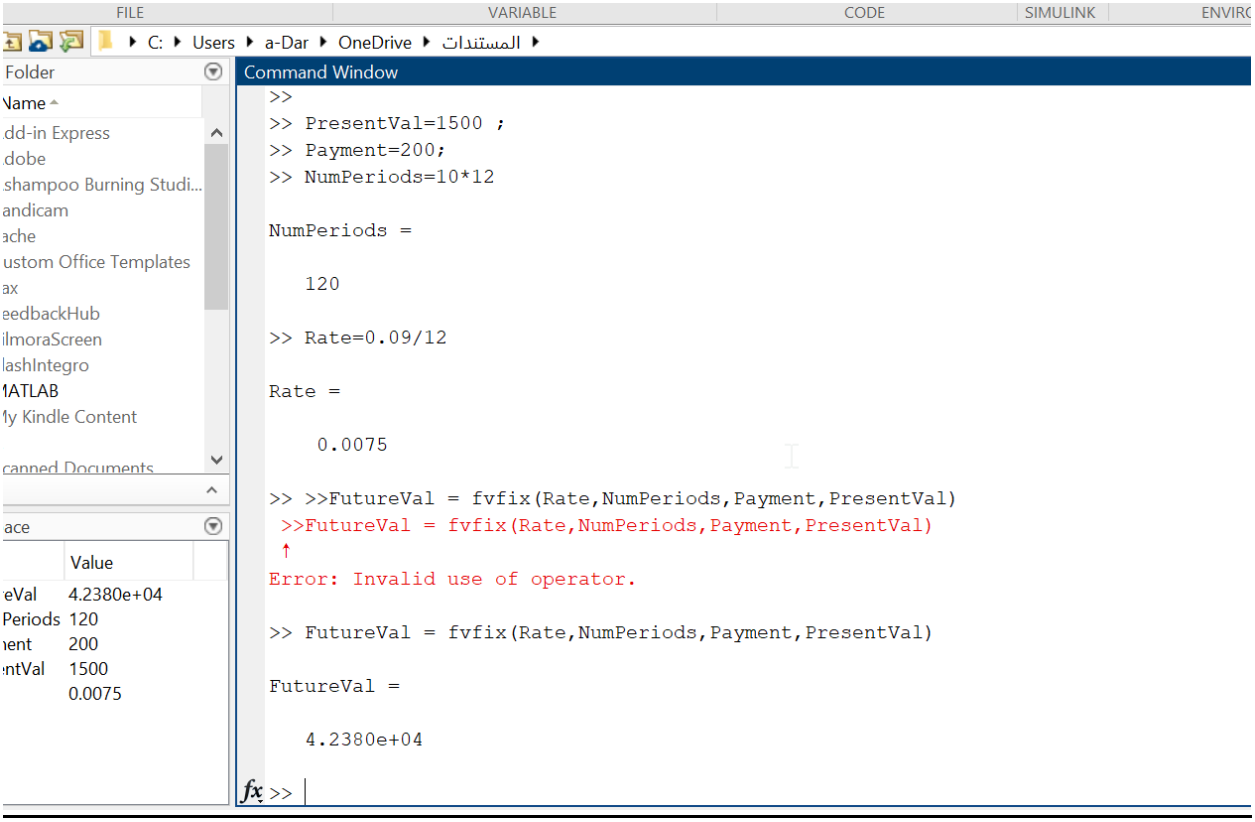
kspace
Value
Size
18×1 double 18×1
20×1 double 20×1
20×1 double 20×1
19×1 double 19×1
0.2027
0.1438
0.1116
0.0912
0.0771
0.0668
0.0589
0.0527
0.0477
0.0435
0.0400
0.0371
0.0345
0.0323
0.0303
0.0286
0.0270

Exercise 2: [3]

1) Find the monthly payment for 24 payments loan of $9000 with an annual interest rate of 12.75% convertible monthly.



2) Calculate the future value of a series of equal payments using a saving account that has a starting balance of $1500. $200 is added at the end of each month for 10 years and the account pays 9% interest compounded monthly.



Exercise 3: [5]

A- The price of treasury for bond at three different yield values

Where

yield rate 0.04,0.05,0.06

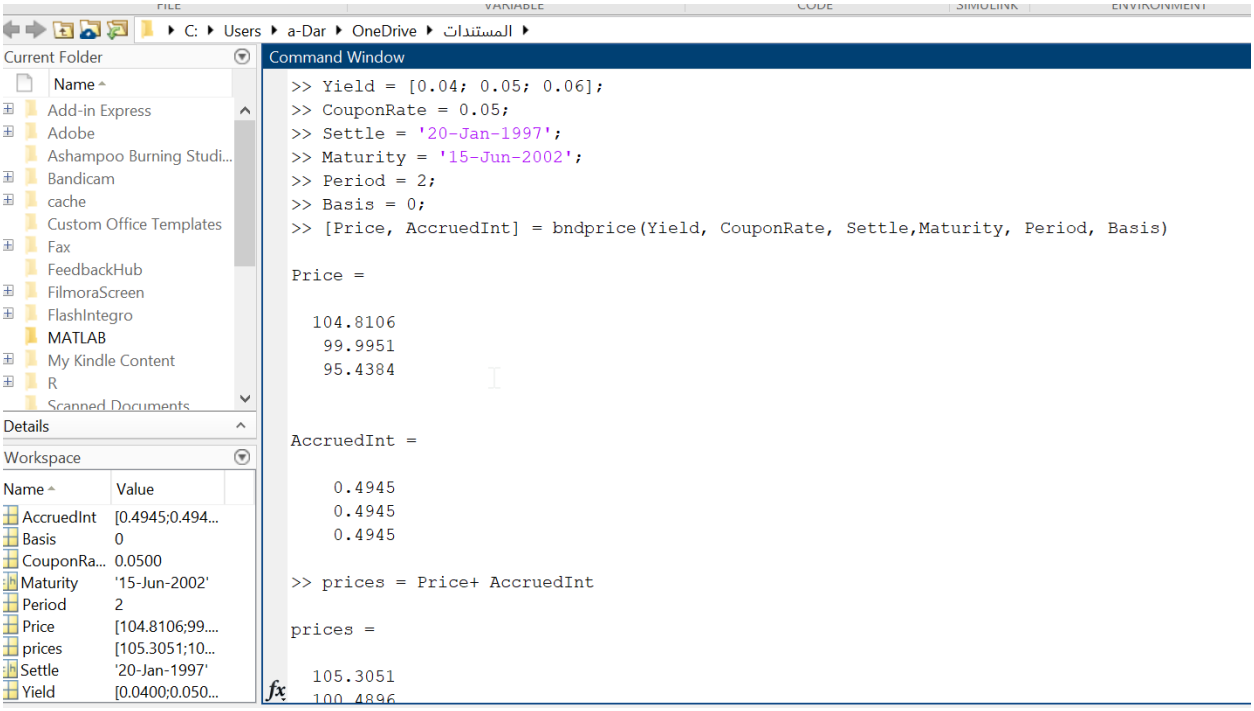
coupon rate= 0.05 ,

Settle 20/January/1997 ,

maturity 15/jun/2002,

period =2,

Basis=0.



B- From following information

Settle: 12/Jan/2000

Maturity= 1/Oct/2001

Issue date=1/Jan/2000

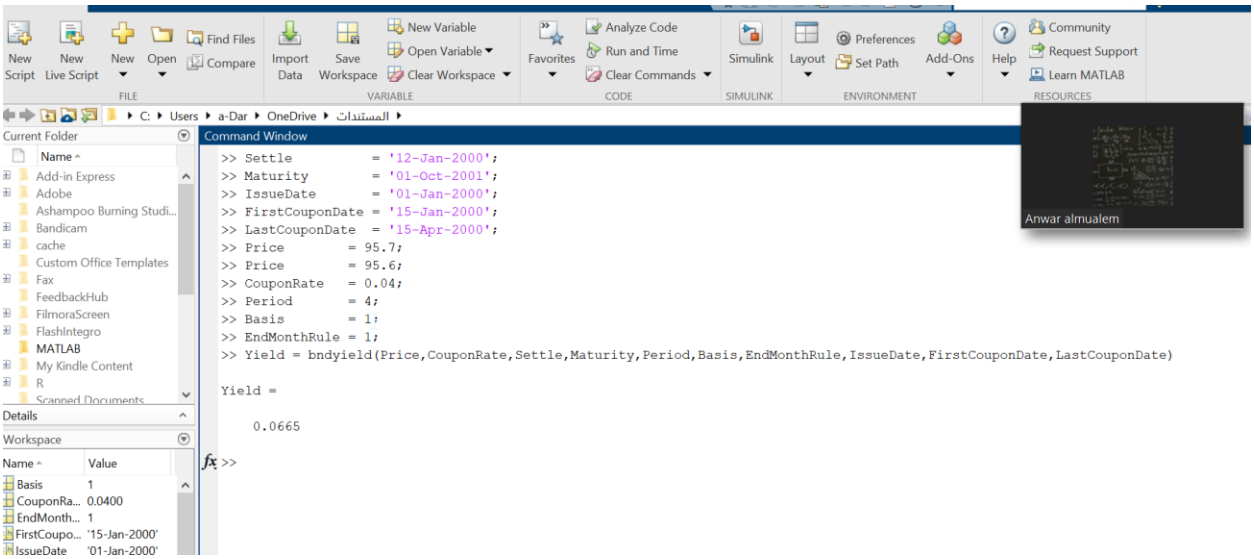
, First Coupon Date=15/Jan/2000,

,Last CouponDate=15/Apr/2000,

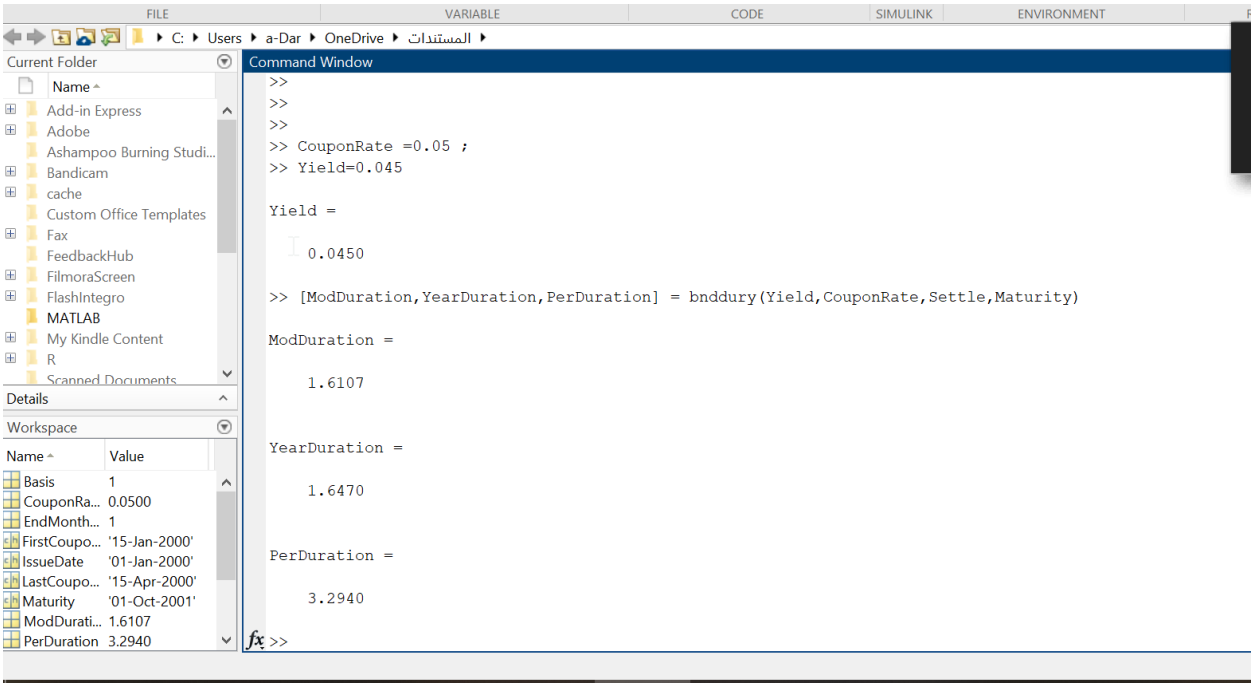
Face value= $100, spacify a purchase price of $95.60, a coupon rate of 4% quarterly coupon payments ,and a 30/360 day-count convention (Basis=1).

1) Calculate yield by using the function
2) if you change the coupon Rate =0.05 and Yield= 0.045,

Calculate ModDuration, YearDuration, and PerDuration .



2-

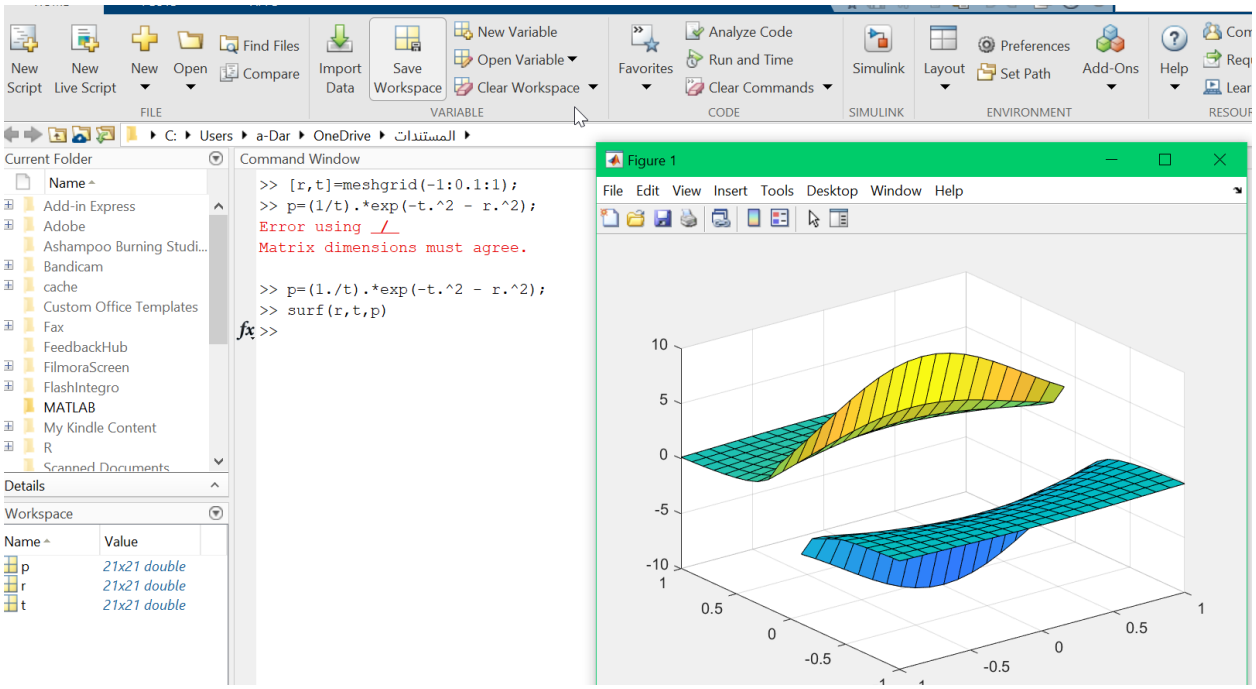


Exercise 4: [3]

Let the price function define as follows

P= $\frac{1}{t}\ e^{(-t^2-r^2)}$, where $t, r \in (-1,1)$ where the length of period is 0.1, and t represent the time and r represent the interest rate

1- Plot p,t,r in 3D.



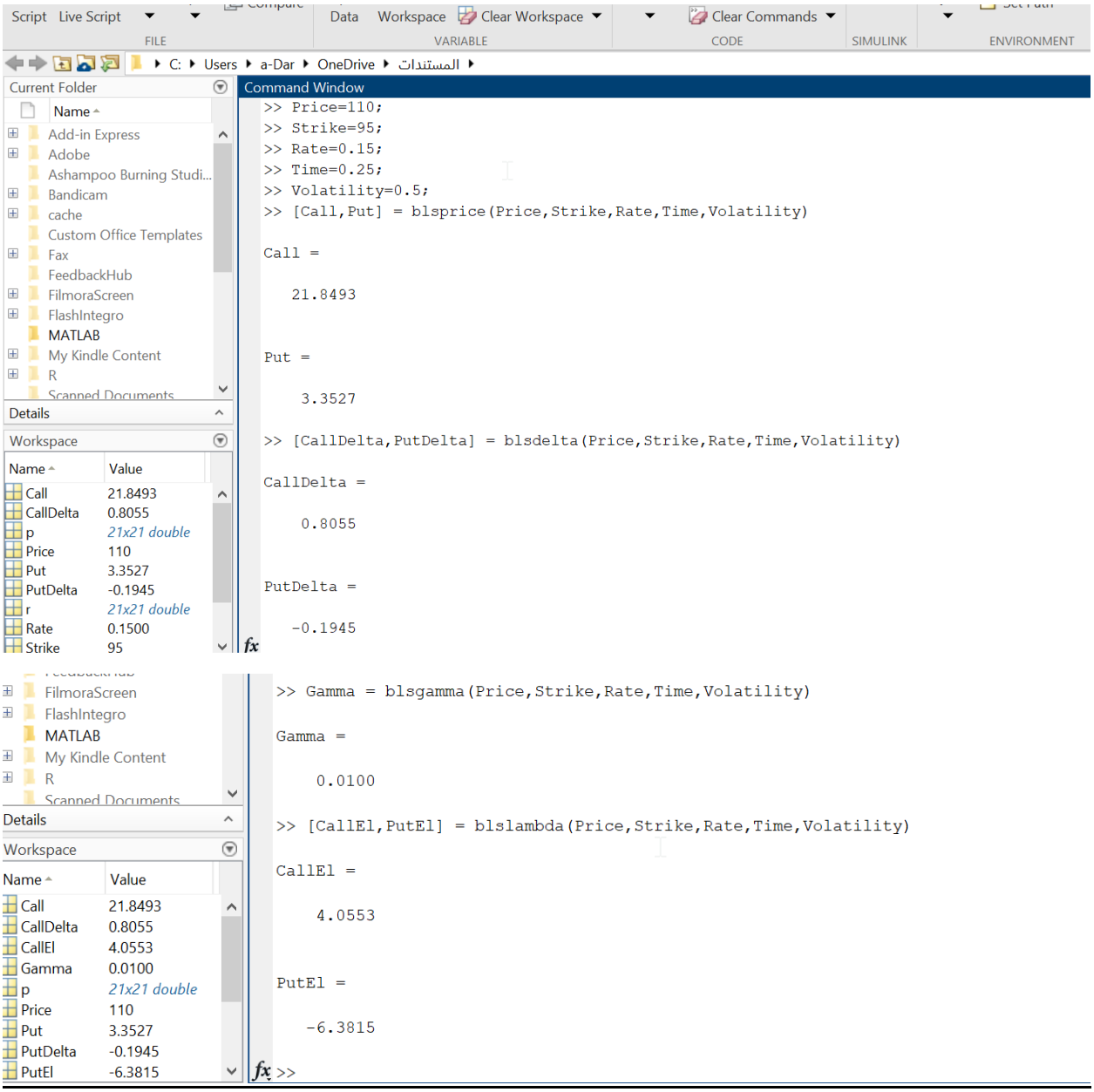
Exercise 5: [6]

Suppose you have the following information of a European option

The asset price is $110.00, the exercise price is $95.00, the risk-free interest rate is 15%, the time to maturity is 3 months in a year , the volatility is 0.50, and the dividend rate is 0

Calculate :

call and put prices of a European option and its **delta, gamma, lambda**, and implied **volatility.**



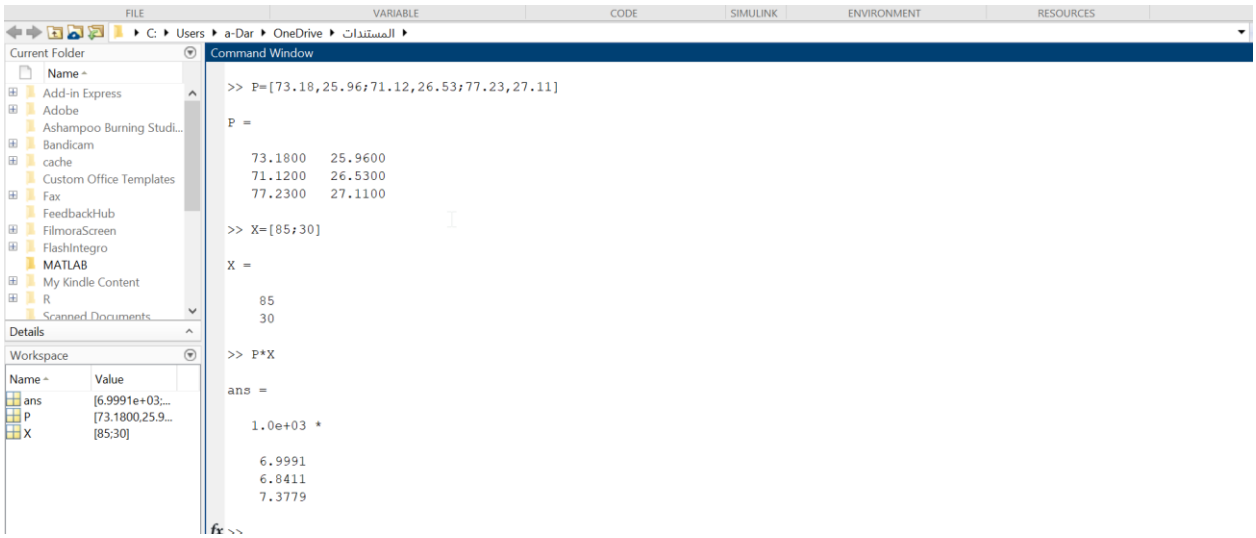

```
>> Volatility = blsimpv(Price,Strike,Rate,Time,Call)

Volatility =

    0.5000
```

And the put is NaN

B- If you have the price matrix in three days for risky asset as follows

$$P=\begin{bmatrix}73.1800 & 25.9600\\ 71.1200 & 26.5300\\ 77.2300 & 27.1100\end{bmatrix}$$

How much do you need to invest in these risky asset in order to get $ 85 in first risky asset and $ 30 in second risky asset.



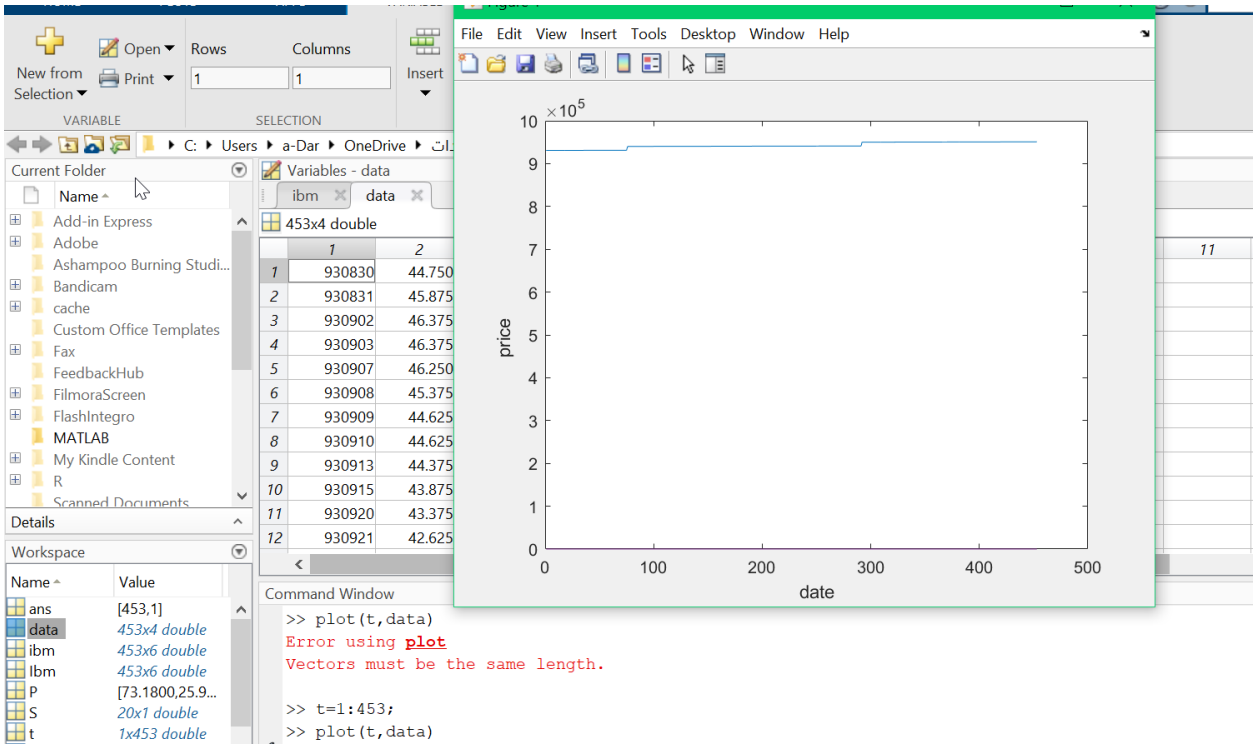
6999.1>>>for the first day

6841.1>>> for the second day

7377.9 >>> for the third day

c) load ibm data and then plot the first fourth column vrs time

where y axis represent price and x axis represent the date from earliest day to latest day.


New from Selection
Open
Print
Rows
Columns
1
1
Insert
VARIABLE
SELECTION
C: Users a-Dar OneDrive
Current Folder
Name
Add-in Express
Adobe
Ashampoo Burning Studi...
Bandicam
cache
Custom Office Templates
Fax
FeedbackHub
FilmoraScreen
FlashIntegro
MATLAB
My Kindle Content
R
Scanned Documents
Details
Workspace
Name
Value
ans [453,1]
data 453x4 double
ibm 453x6 double
Ibm 453x6 double
P [73.1800,25.9...
S 20x1 double
t 1x453 double
Variables - data
ibm
data
453x4 double
1 2
1 930830 44.750
2 930831 45.875
3 930902 46.375
4 930903 46.375
5 930907 46.250
6 930908 45.375
7 930909 44.625
8 930910 44.625
9 930913 44.375
10 930915 43.875
11 930920 43.375
12 930921 42.625
11
Command Window
>> plot(t,data)
Error using plot
Vectors must be the same length.
>> t=1:453;
>> plot(t,data)
File Edit View Insert Tools Desktop Window Help
×10^5
price
date
0 100 200 300 400 500
0 1 2 3 4 5 6 7 8 9 10