برنامج

هندسة الغزل والنسيج

Textile Engineering Department

كلية الهندسة – جامعة المنصورة

معمل الحاسب الآلي

٢٠٢٠-٢٠٢١

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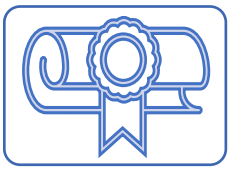

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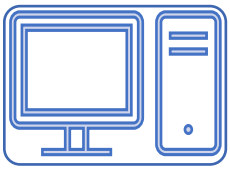

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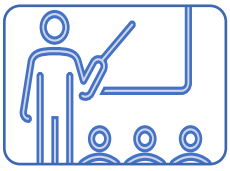

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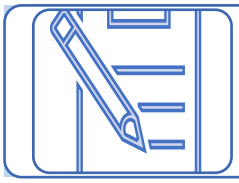


Basic laboratory information
البيانات الأساسية للمعمل

اسم المعمل	الحاسب الآلي
القسم العلمي	الغزل والنسيج
تاريخ انشاء المعمل	٢٠٠٨
المشرف	د/ رحاب عبد الخالق
أمين المعمل	أ/ احمد كمال سرحان
الموقع بالنسبة للكلية	مبنى المعامل الشرقية –الدور الثانى – اسفل المكتبة
مساحة المعمل	٦٠متر مربع

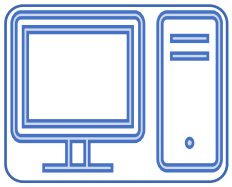
Laboratory Mission
رسالة المعمل

الرسالة

رفع مهارات حل المشكلات لطلاب برنامج هندسة الغزل و النسيج من خلال تعلم البرمجة التي تلهم الطلاب للاستكشاف والتجربة والوصول إلى الاستنتاجات وبالتالي شحذ التفكير المنطقي وتنمية السلوك التعليمي لدى الطلاب.

Mission

Raising the skills of problem solving of students of textile engineering program through learning coding by programming languages which inspire students to explore, experiment and arrive at conclusions and thus honing logical thinking and develop learning behaviors.

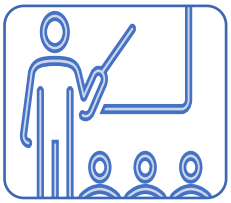


Laboratory Instrunments

الاجهزة والمعدات داخل المعمل

- **يحتوى المعمل عدد ١٦ جهاز حاسب آلي و يوضح الجدول التالي المواصفات الفنية لها:**

Processor	Number	Specifications
Intel® *Core™* I3 G7	5	**MB G.B H110M RAM 4G HDD 80G Monitor LG17 FLAT**
Intel® *Core™2 Duo Processor, 2.93 GHz,*	5	**MB ecs g41 RAM 2G HDD 320 G sata Monitor 17" CRT**
Intel® *Core™2 Duo Processor, 2.93 GHz,*	6	**MB ecs g41 RAM 1G HDD 320 G sata Monitor 17" CRT**



Laboratory Student Beneficiaries
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عدد الطلاب المستفيدين من المعمل	٧٤
الأقسام العلمية المستفيدة من المعمل	قسم هندسة الغزل والنسيج
الفرق الدراسية المستفيدة من المعمل	الأول – الثانية – الثالث- الرابعة
المقررات الدراسية التي تستفيد من المعمل	• Computer Applications in Spinning 1 • Computer Applications in Textiles.2 • Computer Applications in Textiles.3 • Project
الأنشطة الطلابية داخل المعمل	تنفيذ برامج تطبيقية في مجال هندسة الغزل والنسيج باستخدام لغات البرمجة
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Laboratory Practical Exercises

التمارين العملية داخل المعمل

TXE 6115: Computer application in spinning 1

COMPUTER LAB SHEETS

1st Year/ First Semester

Dr. Rehab Abd Elkhalek
TEXTILE ENGINEERING DEPARTEMENT

- Textile Engineering department **- TXE 6115: Computer application in sinning 1** **- Sheet No 1 (Sequence Algorithms)**	**Date:** **Student Name:** .....

1- Write an algorithm and draw a flow chat to calculate and print the sum and the average of three numbers .

2- Write an algorithm and draw a flow chart to read a distance in millimeters and print it in meters, centimeters, and millimeters.

3- At the beginning of a journey the reading on a car's odometer is **S** kilometers and the fuel tank is full . After the journey , the reading is **F** kilometers and it takes **L** liters to fill the tank . Write an algorithm and draw a flowchart to calculate and print the rate of fuel consumption in Km/liter.

4- A farmer has **B** meter wide , **L** meter long. The field yields **C** cubic meters grain per feddan (1 feddan = 4000 square meter). The farmer has a number of cylindrical grain silos, **R** meters in radius , **H** meter in height in which he stores the harvest. Write an algorithm and draw a flow chart that calculate and print the number of used silos.

- extile Engineering department **- TXE 6115: Computer application in sinning 1** **- Sheet No 2 (Algorithms with Decision)**	**Date:** **Student Name:** .....

1- Write an algorithm and draw a flowchart to input the radius of a circle and output the area and circumference of the circle if only area exceed 20.

2- A system of linear equations of the forms:

$a_1X + b_1Y = c_1$

$a_2X + b_2Y = c_2$

can be solved using the equations:

$X= (c_1b_2- c_2b_1) / (a_1b_2-a_2b_1)$

$Y= (c_2a_1- c_1a_2) / (a_1b_2-a_2b_1)$

Taking into consideration that division by zero is not allowed.

3- Draw a flowchart and write an algorithm that reads three numbers and prints the largest.

4- Draw a flowchart and write an algorithm that reads two numbers and print a message telling whether the first number is equal to, greater than, or less than the second number.

5- Draw a flowchart and write an algorithm to read the name and score of a student and assign a letter to the student according to the following grading scheme:

Score	Grade	Rate of appreciation
90-100	A	Outstanding
80-90	B	Very good
70-79	C	Good
60-69	D	Pass
0-59	E	Fail

The algorithm should print the student's name, grade and rate of appreciation.

6- Draw a flowchart and write an algorithm to compute and print the gross salary of an employee, given the number of hours worked per week and the employee's hourly rate. The employee is paid at the hourly rate for the first 35 hours. Thereafter, overtime is paid at 1.5 times the hourly rate for the next 25 hours, and 2 times the hourly rate

for a further 10 hours. The employee is not allowed to work more than 70 hours per week.

7- A salesman receives a commission on the following basis:

Sales	Commission
L.E **0 to 500**	2%
Over **500 to L.E 5000**	5%
Over L.E **5000**	7%

Draw a flowchart and write an algorithm to read the amount of sales of a salesman and print his commission.

- Textile Engineering department - TXE 6115: Computer application in sinning 1 - Sheet No 3 (Algorithms with loops)	Date: Student Name: .....

1- Write an algorithm and draw a flowchart to input the radius of ten circles and output the area and circumference only for circles with an area that exceed 20 .

2- Rewrite the algorithm in question 1 in order to output the number of circles that do not have area more than 20.

3- Write an algorithm and draw a flowchart to calculate and output the area and circumference of an unknown number of circles allowing the radius as an input. The algorithm will end if the input radius is zero.

4- Rewrite the algorithm in question 3 in order to provide output only for circles with an area that exceed 20 and output the number of circles that do not have area more than 20.

5- Write an algorithm and draw a flowchart to find the factorial of number n (n!=1x2x3x…n)

6- Write an algorithm and draw a flowchart to find sum of series 1 – X + $X^2 - X^3 \ldots X^n$

7- Write an algorithm and draw a flowchart to print multiplication Table of a number.

8- Write an algorithm and draw a flowchart to generate first n Fibonacci terms 0,1,1,2,3,5…n (n>2).

9-Write an algorithm and draw a flowchart to print the results of the following:

1+ 1
1+ 2
1+ 3
2+ 1
2+ 2
2+ 3
3+ 1
3+ 2
3+ 3

10+1
10+2
10+3

10- Write an algorithm and draw a flowchart to determine the sum of the following series:

1 +1/2 + 1/4 + 1/6 + 1/8 + 1/10 +…. 1/20

Textile Engineering department **- TXE 6115: Computer application in sinning 1** **- Sheet No 4**	**Date:** **Student Name:** .....

Q1 Complete the following sentences

a) MATLAM stands for .....

b) The default layout of MATLAB desktop displays four windows:

..... , ... , ...

and ..... .

c) The ..... **is a special folder where MATLAB expects to find files that you want to open and where it will store files that you want to save.**

d) Commands are typed into the ..... window.

e) The symbol ..... **in the Command window indicates that the MATLAB is ready to obey your every command.**

f) If you wish to see the variables that you have brought into existence by assigning values to them, you can look at the .....

g) You can repeat commands by double clicking them in the ..... **window.**

Q2

What is the difference between the output of the following two commands :

a- >> x=10**;**

……

b- >> x=10

……

Q3

If we exit from MATLAB, all the variables will be lost. MATLAB provides an a command.

>> save

Typing the command >>..... causes all the variable names and their values to be saved in a file named ……

When MATLAB starts, we can get them back with the command

>>…….

Q4

What is the output of the following commands:

a- >> dime = 2 + ...

8

……

……

b- >> w = 4, a = 9.8; v = 4.5;

……

……

……

>> a, v

……

……

c- >> 1 = x

……

……

Q5 What is the difference in the output of the two commands :

The first :
>> x = 1+5
.....

The second :
>> % x = 1+5
.....

Q6 After the command

>> quit

MATLAB will ……

Q7

- The MATLAB command clear is used to…….
- The MATLAB command clc is used to ……..

Q8

Which of the following is a valid name for a MATLAB variable :

i- ASDE
ii- _date
iii- First_name
iv- %ft
v- First name

Textile Engineering department **- TXE 6115: Computer application in sinning 1** **- Sheet No 5**	**Date:** **Student Name:** .....

Q1- Choose the correct answer :

i. To accomplish more complicated tasks you should write your commands into m. file by using the.....window.

a- Command Window
b- Command history
C- Edit window
d- MATLAB desktop window

ii. To pop up the editor window you can write the command :

a- >> open
b- >> edt
c- >>edit
d- >>editor

iii. The file extension used by the MATLAP editor is always …….

a- .exe
b- .m
c- .p
d- all the above

iv. The text in the M-file written by using the edit window is a computer program which is sometimes called ……..

a- source Code
b- portable code
c- executed Code
d- Non of the above

v. **When an M-file in executed in the command window , the entire contents of the file is translated into ..... before execution phase begins.**

a- source Code
b- portable code
c- executed Code
d- Non of the above

vi. **You can translate the content of any M-file into p-code and save it into a file for distribution by the command ……..**

a- >> edit
b- >>save
c- >> pcode
d- Non of the above

vii. **Which of the following is a right characteristic of a p-file** :

a- p- file is version dependent
b- p- file is version independent
c- P-file has the same name of the M-file but with the **.m** extension replace by ***.p***
d- (a and c)
c- (b and c)

Q2.

i. What is the output of the following MATLAB command

>> s=input ('please input your name:')

If you use the keyboard to input:

a) 3

……

……

b) 4+7

……

……

c) T

……

……

d) 'T'

……

……

ii. What is the difference between the output of MATLAB command in case of (a) and (b):

a) >> fprintf('Hi, my name is Ahmed. ') ; fprintf('What is your name?\n');

……

b) >> fprintf ('Hi, my name is Ahmed.\n ') ; fprintf('What is your name?\n');

……

……

3) What is the output of the following MATLAB commands:

i- >> fprintf('The result is % d\n ' , 100*3)

……

……

……

ii- >> fprintf(' If the number of items is %d' and the price of each is %f , then the total cost is %f \n ', 3 , 10.75 , 3*10.75)

……

……

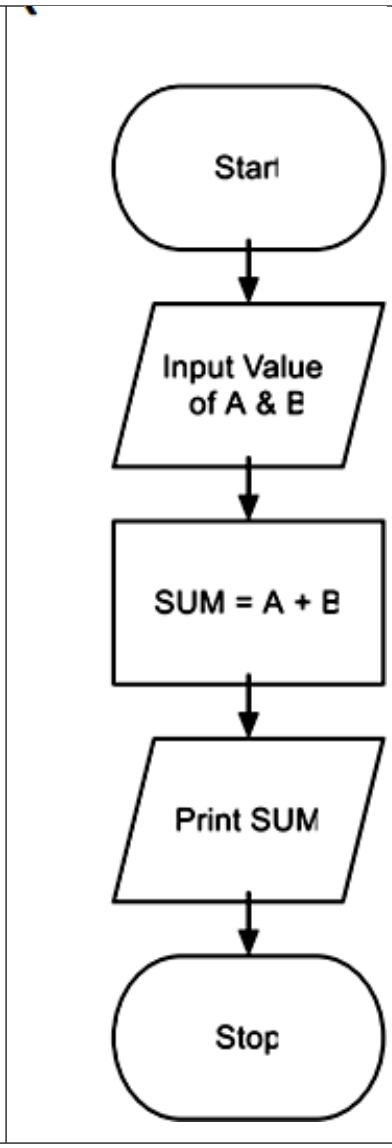
Q3

i- Write a MATLAB script to input your name and age from the keyboard and then print the following message:

Your name is Ahmed.
Your age is 20 years .

……
……
……
……
……
……
……
……
……
……
……
……

ii- Write a MATLAP script for the following flowcharts



iii-

iv- Write a MATLAP script to read the radius of a circle and print the circumference and the area of the circle .

……
……
……
……
……
……
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……

v- Write a MATLAP script to read a distance in millimeters and print it in meters, centimeters, and millimeters.

……
……
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……
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……
……
……
……
……
……

Textile Engineering department **- TXE 6115: Computer application in sinning 1** **- Sheet No 6 Matrices and Operators**	**Date:** **Student Name:** ……

❖ Building matrix

Q1 Execute the following commands and write the output :

1- >> x_values = [1 2 10]

>>size(x_values)

2- >> y = [1 ; 4 ; 7]

>> size(y)

3- >> Z=[0 1 -1 ; 2.5 pi 100]

>> size(Z)

Q2 What is the value of the variable C after each of the following commands.

1- >> c=1:7

2- >> c=1:3:10

3- >> c=7:-3:1

4- >> c=100:-10:-100

5- >> c=7:3:1

6- >>c= colon(1,7)

Q3 If M = [1 : 4 ; 5 : 8 ; 9 : 12]

3-1 What is the output of the following commands

1- >> M(2,3)

2- >> M(3,3)

3-2 What is the value of variable M after the following commands:

1- >> M(2,3)=97

2- >> M(4,5)=456

3- >> M=99

Q4 If b=[1 2 3 ; 4 5 6]

What is the output of the following commands:

1- >> b(2 , [1 3])

2- >> b([2 1] , 2)

3- >> b(2,1:3)

4- >> b(end,2)

5- >> b(end,end)

6- >> b(1,end-1)

7- >> b(end+1 ,1)

❖ Combining Matrices to Build New Ones

Q5 If the matrix a and b are built as follows :

>> a=[1 2 ; 3 4 ; 5 6];

>> b=[9 8 ; 7 6 ; 5 4];

What is the value of the variable c after the following commands?

1- >> c= [a b]

2- >> c=[a ; b]

Q6 If the matrix a1 and a2 are built as follows :

>> a1=[1 1 1 ; 1 1 1]

>> a2=[1 2 3]

What is the value of the variable b after the following commands ?

1- >> b=[a1 a2] **2- >> b=[a1; a2]**

Q7 If the matrix b1 , b2 and b3 are built as follows :

>> b1=[1 ; 1]
>> b2=[2 2 ; 2 2]
>> b3=[3 3 3 ; 3 3 3]

What is the value of the variable a after the following commands ?

1- >> a=[b1 b2] **2- >> a=[b1 b2 b3]**

3- **>> a=[b1 ; b2 ; b3]** **4- >> a=[b1 b2 b3 b1]**

❖ The Transposition Operator

Q8 ***If the matrix X and H is built as follows :***

```
>> X = [ 1 ; 3 ; 5 ; 7]
>> H = [ 1   2   3 ;  4   5   6 ]
```

What is the output of the following commands ?

1- >> X' **2- >> H'**

Arithmetic on arrays

Addition , subtraction, Multiplication and Division

Q9 ***If the matrix x and y are built as follows :***

```
>> x=[1   4 ; 7   1 ; 5   5]

>>y= [2  -4 ; 6   2 ; 1   3]
```

What is the value of the variable z after the following commands

1- >> z=x+y **2- >> z=x-y**

3- >> z = x .*y

4- >> z=x./y **5- >> z=x.\y**

Q10 ***If the matrix x and y are built as follows :***

>> x=[1 5 -2 ; 3 0 7]

>> y= 1:6

What is output of the following commands ?

1->> z=x+y **2- >> z=x-y** **3- >> z=x-y** **4- >> z=x.*y**

Q11 ***If the matrix a and b are built as follows :***

>> a= [1 2 3 ; 4 5 6 ; 6 1 1 ; 0 1 3]

>> b= [2 -2 ; 3 8 ; 7 4]

What is the value of the variable c after the following commands ?

1- >> c= a*b 2- >> c= b*a

❖ Operator precedence

Q12 Write the output of the following MATLAP commands:

1- >> 2+3*4 **2- >>(2+3)*4**

3- >>1:3+10 **4- >>(1:3)+10**

5- >>6-2-3 **6- >>6-(2-3)**

7- >>6^2^3 **8- >>6^(2^3)**

9- >> 1 : 2 : 5' **10- >> (1: 2: 5)'**

Textile Engineering department - TXE 6115: Computer application in sinning 1 - Sheet No 7	Date: Student Name……

Q1.

If the vector x is built as follows :

x =

1 4 7

What is the output of the following commands?

>> length (x)

>>min(x)

>>max(x)

>>mean(x)

>>median(x)

>>sort(y)

>>sum(x)

>>std(x)

If the matrix y is built as follows :

y =

1 4 7
7 1 9
5 9 5

What is the output of the following commands?

>> length (y)

>>min(y)

>>max(y)

>>mean(y)

>>median(y)

>>sort(y)

>>sum(y)

>>std(y)

Q2 What is the output of the following commands?

>> zeros(3,4)	>>rand(2,3)	>>ones(3,2)	>>eye(4,4)

Q3. *If the x , y and z are built as follows :*

x =

1 2 3 4 5

y =

5 4 3 2 1

z =

1 2 3
3 2 1
5 4 3

What is the output of the following commands?

>> a = min(x)	>> [a b] = min(x)
>>a = min(min(z))	>>a = min(x,y)
>>a = min(z)	>> [a b] = min(z)
>>b= sum(z)	>>b= sum(sum(z))

Q4- What is the output of the following commands?

<table>
<tr><td>i.</td><td colspan="3">fprintf(' a = %d b = %dc = %d \n ' , 4, 5 ,6)

……

fprintf(' a = %d \t b = %d \t c = %d \n ' , 4, 5 ,6)

……

fprintf(' a = %d \t b = %d \t c = %d \n ',4,5,6,7,8,9)

……

fprintf(' a = %d \t b = %d \t c = %d \n ',4)

……</td></tr>
<tr><td>i.</td><td>>> fprintf ('f = 3 \n') ;
>> f
……
……</td><td>>> fprintf ('f=%d\n ' , 3) ;
>> f
……
……</td><td>>> f = 3 ;
>> fprintf ('f = %d \n', f)
……
……</td></tr>
<tr><td>i.</td><td colspan="2">>>A =[2 4 6 8 10];
>> fprintf (' %d ' , A);
……
……
……</td><td>>> A=[2 4 6 8 10];
>> fprintf ('%d \n', A);
……
……
……</td></tr>
<tr><td>·</td><td colspan="2">>> A =[2 4 6 8 10];
>> fprintf ('No. %d ', A);
……
……
……</td><td>>> A =[2 4 6 8 10];
>> fprintf(' No. %d \n ', A);
……
……
……</td></tr>
</table>

Textile Engineering department **TXE 6115: Computer application in sinning 1** **Sheet No. 8: Scripts with Selection**	**Date:** **Student Name:** .....

Question 1

What is the output of the following MATLAB commands:

>> 10 = = 20

>> 3 = = 35-32

>> x = (45*47 > 2105) + 9

>> x = 45*47 > 2105 + 9

>> x = 16; y = 2; z = x/(y + (y= =0))

>>x =16; y = 0; z = x/(y + (y==0))

Rewrite the following command by using if else statement >> z = x/(y + (y==0))	

>> [4 -1 7 5 3] > [5 -9 6 5 -3]

>> [4 -1 7 5 3] ~= [5 -9 6 5 -3]

>> [4 -1 7 5 3] <= 4

>> [14 9 3 14 8 3] == 14

>> sum ([14 9 3 14 8 3] == 14)

>> 1 && 1

>> 17 && 1

>> -1 && 1

>> -1 || 0

>> pi || 0

Question 2

i. Write a script to read a number and if the number equals 2 it print the message :**'Congratulates ! You guessed my number'**

ii. Write a script to read a number and if the number equals 2 it print the message :**'Congrates ! You guessed my number'** and if the number is not 2 it print the messege: **'Not right'**

iii. Write a script to read a number and if the number is 42 it print the message:
' Wow ! you guesses my number ' . If the number is less than 42 it print the message : **' Too small .Try again'** and if the number is is more than 42 it print the message : **' Too big . Try again'**

iv. Write a script that read the number of the day of the week (from 1 to 7), print the name of the day and identify it as either a week day or a weekend day . If the number is not in the range from 1 to 7 it prints the message " **'Number must be from 1 to 7.'**

Question 3

Write a MATLAB script for each of the decision algorithm questions found in sheet number 2.

Question 4

i- Write a script to takes three inputs, and returns 1 if they are in increasing order, -1 if they are in decreasing order, and zero otherwise.

ii- Write a script to takes three inputs and determine whether the first input is smaller than both of the other two inputs . If it is not smaller than both of them, then it returns 1, otherwise it returns 0.

- Textile Engineering department - TXE 6115: Computer application in sinning 1 - Sheet no. 9 Scripts with loops	Date Student Name :

1- Write a MATLAP script by using *for loop statement* to output the results of the following :

1 + 2
2 + 3
3 + 4
4 + 5
5 + 6

100+ 101

2- Write a MATLAP script by using ***nested for loop statements*** to **print the results** of the following:

1+ 1
1+ 2
1+ 3
2+ 1
2+ 2
2+ 3
3+ 1
3+ 2
3+ 3

10+1
10+2
10+3

3- By using for loop statement write a MATLAP script to determine the sum of the following series:

1 +1/2 + 1/4 + 1/6 + 1/8 + 1/10 +…. 1/20

4- Write a MATLAB script for the flowchart shown in Figure (1) that reads ten pairs of numbers , calculates and prints the average of each pair.

Data Table

Input Variables

X1, X2: Pair of numbers

Output Variable

Av: The average of the pair of numbers

Program Variables

Sum: The sum of the pair of numbers
C: Counter

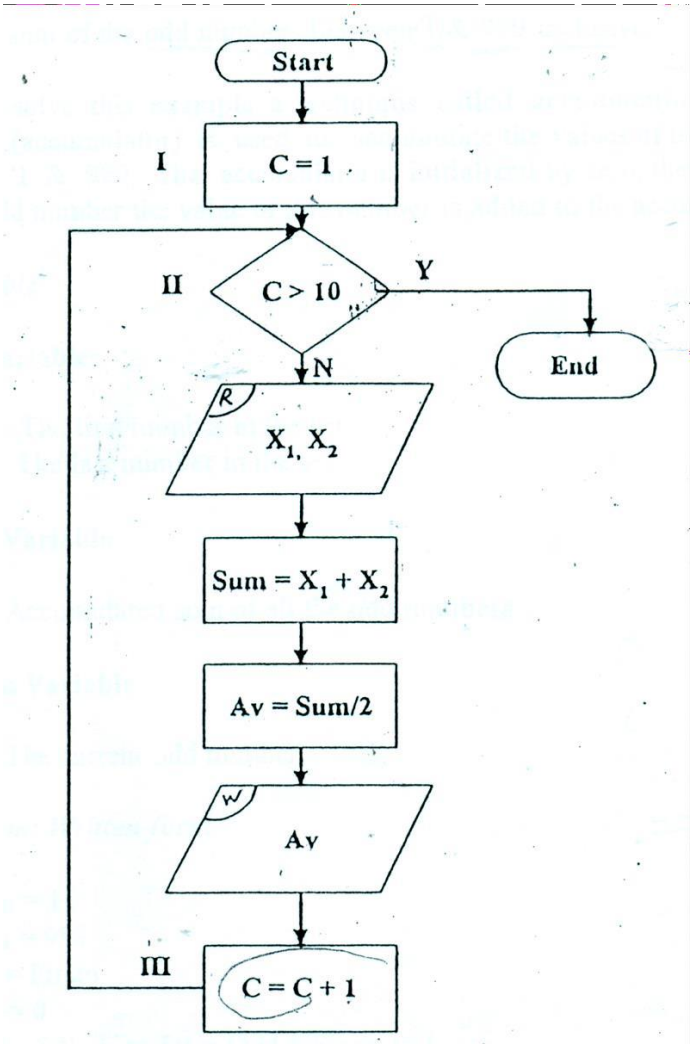


Figure (1)

5- Write a MATLAB script for the flowchart shown in Figure (2) that computesand prints the sum of the odd numbers between 1 & 999 .

Data Table

Input Variables

Firstn: The first number in the set
Lastn: The last number in the set

Output Variable

Sum: Accumulated sum of all the odd numbers

Program Variable

Odd: The current odd number

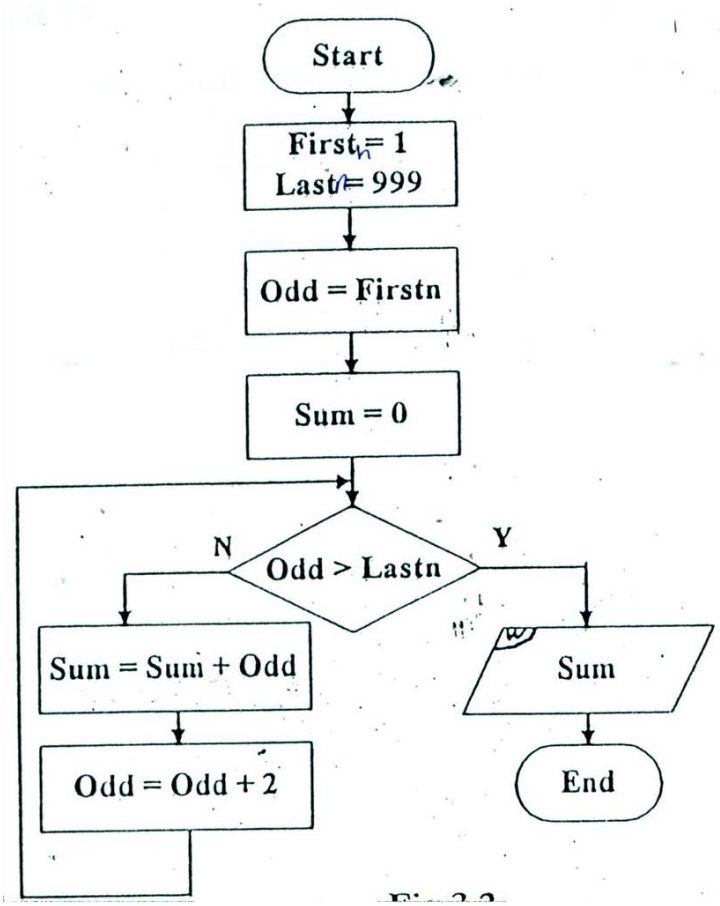


Figure (2)

6- Draw a flow chart and write MATLAB script that will calculate the area and circumference of ten circles, allowing **radius** to be an **input variable**, and **output radius**, **area**, and **circumference** only if the area of the circle is greater than 20. The **number of circles that do not have an area greater than 20 should also be output.**

7- At present , the annual salaries of the employees A&B are L.E 2400 and L. 000 respectively. The annual increments of A and B are 12% and 10 % respectively . **Write MATLAB script and draw a flow chart** to **calculate** and **print** the number of years re ired for the salary of A to exceed the salary of B.

8- Write a MATLAB script will calculate the area and circumference of **any number of circles**, allowing radius to be an input variable, and output radius, area, and circumference only if the area of the circle is greater than 20. The number of circles examined that do not have an area greater than 20 should also be output. The script **should terminate when** the user input the radius = zero.

TXE6215 : Computer Applications in Textiles 2

COMPUTER LAB SHEETS

2nd Year/ First Semester

Dr. Moaz Ahmed Samy
TEXTILE ENGINEERING DEPARTEMENT

Sheet 1

1. Find the output of the following

```
clc
clear
format short
a=zeros (1, 5)
b=[3 45 4; 5 6 2; 2 34 5]
c=length (b)
d=size(b)
e=[1 2 3]
f=[4 5 6]
g=e.*f
h=e./f
i=e.^f
```

```
ans
a =    0    0    0    0    0
b =3   45    4
    5    6    2
    2   34    5
c =    3
d =    3    3
e =    1    2    3
```

- - - - - - - - - - - - - - - - -

2. Find the output of the following

```
clc
a= [16 3 2 13; 5 10 11 8; 9 6 7 12; 4 15 14 1]
b=a(1:4,4)
c=a(:,end)
```

```
d=sum(a(1:4,4))
e=magic(4)
f= [e e+1; e+2 e+3]
g= e(:,[1 3 2 4])
'You can print out like this'

ans
a =16    3    2   13
    5   10   11    8
    9    6    7   12
    4   15   14    1
b =13
    8
   12
    1
c =13
    8
   12
    1
```

- - - - - - - - - - - - - - - - -

3. Find the output of the following

```
clc
a=[34 5 3; 2 3 4]
b=a(:,2)
c=a(2,:)
d=a(2,3)
a(2,3)=90
e=max(a)
f=max(e)
g=[1:9]
g(9)=[]
g(1:5)=0
g(1:5)=[]

ans
a =34    5    3
    2    3    4
b =5
    3
c =2    3    4
```

```
d =   4
a =34     5     3
     2     3    90
e =34     5    90
```

- - - - - - - - - - - - - - - - -

4. Find the output of the following

```
clc
a=1:10
b=100:-7:50
c=0:pi/4:pi
A = [1 2 3 4;1 2 3 4;1 2 3 4;1 2 3 4]
d=sum(A(1:3,1))
%%%%%%%%%%%%%%%%
e=sum(A(:,end))
f=sum(1:16)/4
%%%%%%%%%%%%%%%%
B = magic(4)
C = B(:,[1 3 2 4])
Z = zeros(2,4)
F = 5*ones(3,3)
N = fix(10*rand(1,6))
D = [1 2 6 4;1 2 3 4;1 2 3 4;1 2 3 4]
D(:,4)=[]
m=D'*D
n=det(A)
o=rref(D)
%inv(D)
%eig(D)
p=ones(4,1)
```

```
ans
a =  Columns 1 through 8
```

```
     1     2     3     4     5     6     7     8
  Columns 9 through 10
     9    10
b =  100    93    86    79    72    65    58    51
c =    0    0.7854    1.5708    2.3562    3.1416
```

A =1	2	3	4
1	2	3	4
1	2	3	4
1	2	3	4
d =	3		
e =	16		
f =	34		
B =16	2	3	13
5	11	10	8
9	7	6	12
4	14	15	1
C =16	3	2	13
5	10	11	8
9	6	7	12
4	15	14	1

- - - - - - - - - - - - - - - - -

5. Find the output of the following

```
clc
clear
A = [16 3 2 13; 5 10 11 8; 9 6 7 12; 4 15 14 1]
b=sum(A)
c=A'
d=sum(A')
e=diag(A)
f=sum(diag(A))
g=A(1,4) + A(2,4) + A(3,4) + A(4,4)
h=A
g=h(1,1)

syms a b c d ;
R = [a      b;
```

```
     c      d]
 Q= det(R)

fprintf('%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%')
%det=ad-bc
```

```
ans
A =16     3     2    13
     5    10    11     8
     9     6     7    12
     4    15    14     1
b =    34    34    34    34
c =16     5     9     4
     3    10     6    15
     2    11     7    14
    13     8    12     1

d =    34    34    34    34
e =16
    10
     7
     1
```

- - - - - - - - - - - - - - - - - -

6. Find the output of the following

```
clc
clear
a=[1 2 3]
b=[4 2 3]
c=(a==b)
d=(a>b)
e=(a<b)
f=[1 2 3; 4 5 6 ; 7 8 9]
g=[5 8 9 ; 2 9 8 ; 1 1 1 ]
h=f(f>g)
i=g(f>g)
find (f>g)
```

```
ans
a =    1    2    3
b =    4    2    3
c =    0    1    1
d =    0    0    0
e =    1    0    0
```

- - - - - - - - - - - - - - - - -

7. Find the output of the following

```
clear
clc
a = fix(100*rand(1, 3));
 b=randint(1,3,[0 100]);
 a==b
%is each element in matrix a =ach element in matrix b
a~=b
%is each element in matrix a is not equal to each element in matrix
b
 isequal(a,b)
%is matrix a =matrix b
 find(a~=b)
%index where a is not equal b
find(a==b)
%index where a is  equal b
   ans
   ans =    0    0    0
   ans =    1    1    1
   ans =    0
```

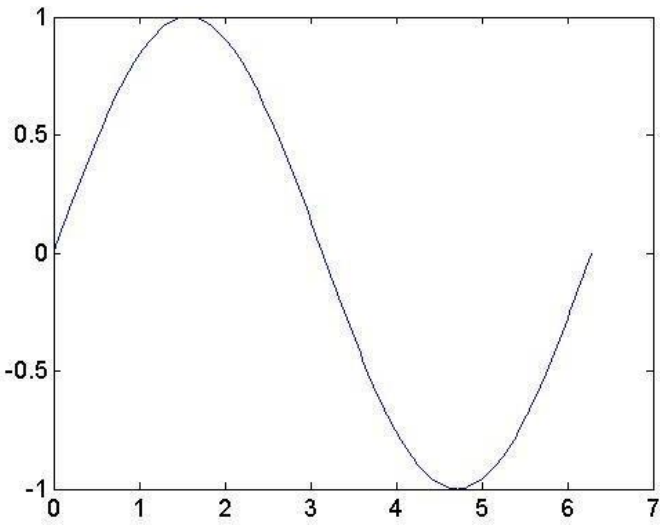
- - - - - - - - - - - - - - - - -

Sheet 3

1. Write a script to define **x** as a vector of linearly spaced values between **0** and **2*pi** (use an increment of **pi/100** between the values), then define y as sine values of **x** and create a line plot of the data.

```
close all
x=0:pi/100:2*pi;
y=sin(x);
```

```
%%%%edit plotting axis
%axis([xmin xmax ymin ymax])
%axis([xmin xmax ymin ymax zmin zmax])
%axis auto
%axis square
%axis equal
%axis auto normal
%axis on
%axis off
%grid on
%grid off
```



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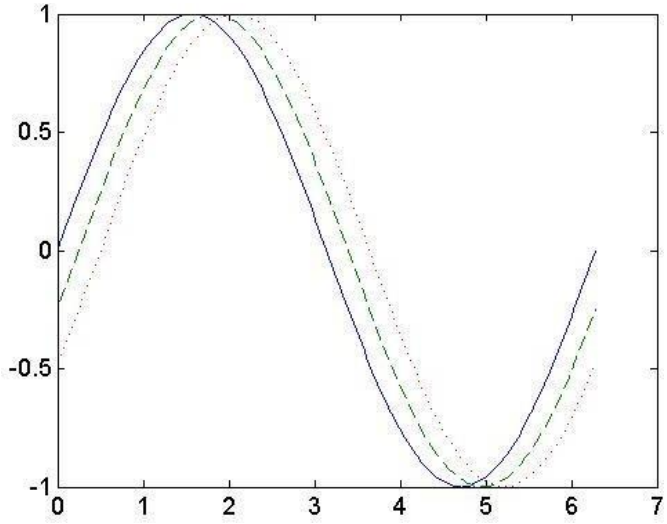
2. Write a script to plot three sine curves with a small phase shift between each line(for example **(sin(x), sin(x-0.25),sin(x-0.5)).** Use the default line style for the first

line. Specify a dashed line style for the second line and a dotted line style for the third line.

```
close all
x=0:pi/100:2*pi;
y1=sin(x);
y2=sin(x-0.25);
```



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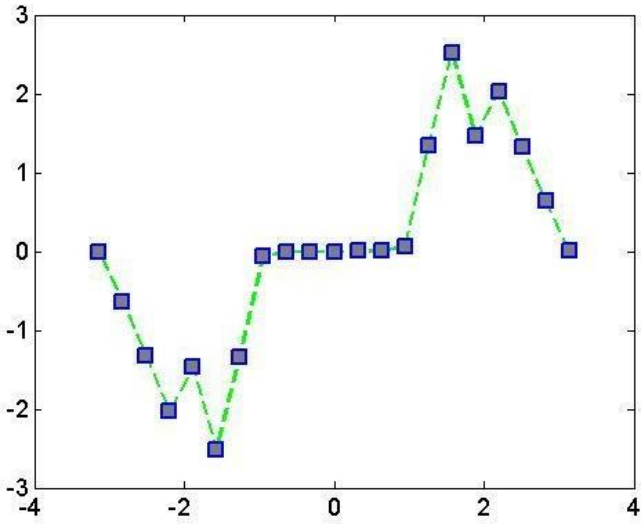
3. Write a script to create a line plot **x** and **y** which are defined as follow: **x** is **100** linearly spaced values between **-pi** and **pi** where**, y = tan(sin(x)) - sin(tan(x)).** Use a dashed green line with square markers. Specify the line width, marker size, and marker colors. Set the marker edge color to blue and set the marker face color using an **RGB** color value.

```
close all
x = -pi:pi/10:pi;
y = tan(sin(x)) - sin(tan(x));
figure
plot(x,y,'--gs',...
```



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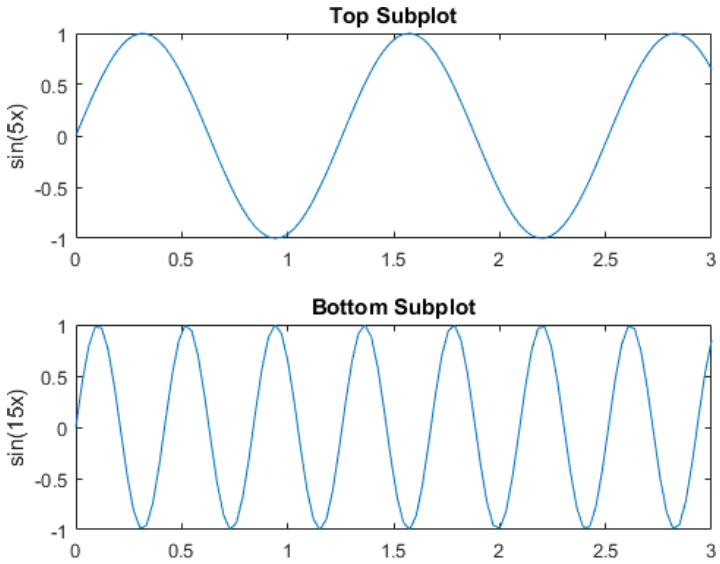
4. Write a script to create a figure with two subplots and create a 2-D line plot in each. Define x as 100 linearly spaced values between 0 and 3 and define y1 and y2 as : y1 = sin(5*x) , y2 = sin(15*x). Add a title and y-axis label to each axes.

```
close all
figure %new figure
x=linspace(0,3);
y1=sin(5*x);
y2=sin(15*x);
subplot(2,1,1);%top subplot
plot(x,y1)
```



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Sheet 4

1. What is the output of the following codes?

A.

```
a = 10;
% check the condition using if statementif a < 20
% if condition is true then print the followingfprintf('a is less
than 20\n' );
end
fprintf('value of a is : %d\n', a);
```

a is less than 20

- -

B.

```
a = 100;
% check the boolean conditionif a < 20
```

```
% if condition is true then print the followingfprintf('a is less
than 20\n' );
else
% if condition is false then print the followingfprintf('a is not
less than 20\n' );
end
fprintf('value of a is : %d\n', a);
```

a is not less than 20

C.

```
a = 100;
%check the boolean conditionif a == 10
% if condition is true then print the followingfprintf('Value of
a is 10\n' );
elseif( a == 20 )
% if else if condition is truefprintf('Value of a
is 20\n' );elseif a == 30
% if else if condition is truefprintf('Value of a
is 30\n' );else
% if none of the conditions is true ' fprintf('None of the
values are matching\n');fprintf('Exact value of a is: %d\n', a );
end
```

None of the values are matching

D.

```
a = 100;
 b = 200;
```

```
% check the boolean conditionif( a == 100 )
% if condition is true then check the followingif( b == 200 )
% if condition is true then print the followingfprintf('Value of
a is 100 and b is 200\n' ); end
end
fprintf('Exact value of a is : %d\n', a );fprintf('Exact value
of b is : %d\n', b );
```

```
Value of a is 100 and b is 200Exact value of a
is : 100
```

---

2. Using If statement, write a code asks the user to enter a positive number and returns its square root.If the user enter 0 or negative number, the code exits.

```
clc
x=input('Please Enter a positive number: ');if x>0
   y=sqrt(x);
```

Sheet 5

1. A code sum the values from 1 to 10.

```
total = 0;
for n = 1:10
        n
        n = n + 1;
        total = total + n;
```

- - - - - - - - - - - - - - - - -

2. A code sums the values from 0 to a number entered by a user.

```
N= input ('enter the number of elements ')
total =0;
for n = 1:N
        total = total + n;
```

- - - - - - - - - - - - - - - - -

3. A code creates 5 random number, each number is inspected, if bigger than 0.5 display a message, if not display a different message.

```
list = rand(1,5); % assigns a row vector of random numbers
for x = list
    if x > 0.5
    fprintf('Random number %f is large.\n',x)
    else
```

- - - - - - - - - - - - - - - - -

4. Use FOR loop to do calculate the following u = [5 4 8 8 2]+ v = [5 5 7 8 8]

```
u = [5 4 8 8 2];
 v = [5 5 7 8 8];
w = u – v;
```

- - - - - - - - - - - - -

```
u = [5 4 8 8 2];
 v = [5 5 7 8 8];
for i = 1:length(u)
        w(i) = u(i) - v(i);
```

- - - - - - - - - - - - - - - - -

5. What is the output of this program?

```
N = 7;
for mm = 1:N
        for nn = 1:mm
        fprintf('*');
        end
fprintf('\n');
end
```

```
*
**
***
****
*****
```

- - - - - - - - - - - - - - - - -

6. write a code calculates the factorial of a number entered by the user

```
clc
clear
z=1;
x=input('enter number: ');
for y=1:x;
```

- - - - - - - - - - - - - - - - -

7. Write a code calculates the square of each element of the matrix [1 2 3 ...10]

```
clc
clear
disp('Original matrix: ')
k=1:10
disp('Square of the matrix: ')
for k=1:10
```

```
ans
Original matrix: k =Columns 1 through 7
1     2     3     4     5     6     7
Columns 8 through 10
8     9    10
Square of the matrix: a =Columns 1 through 7
1     4     9    16    25    36    49
Columns 8 through 10
64    81   100
```

- - - - - - - - - - - - - - - - - -

8. What is the output of the following code:

```
clear
clc
x=input ('enter set of numbers')
for i=1:length(x)
   if x(i)==2
      a=2
      break
    elseif x(i)==3
      a=3
      continue
      elseif x(i)==4
         a=4


   end
   end
```

if the user enters

```
 [2 3 4]
a =     2
[2 4 3]
a =     2
[3 2 4]
a =     3
[3 4 2]
a =     3
a =     4
a =     2
[4 2 3]

[4 3 2]
```

- - - - - - - - - - - - - - - - -

9. Write a code returns the positive numbers of the matrix: a=[-2 4 6 -7 3 5 -45 1 -0.5 2.6] using for loop

```
clear
clc
for a= [-2 4 6 -7 3 5 -45 1 -0.5 2.6]
if a>  0
fprintf('%.1f \n', a)
```

- - - - - - - - - - - - - - - - -

10. What is the output of the following code

```
clc
clear
for y=0:4

    if y==2
    continue
%continue ==jump to end of for and restart 4
```

```
ans
0
1
3
4
```

- - - - - - - - - - - - - - - - -

11. Using If – break statement, write a code asks the user to enter an array of positive numbers only. If the user enters any other number, a message appears, ''the data contains invalid values''.

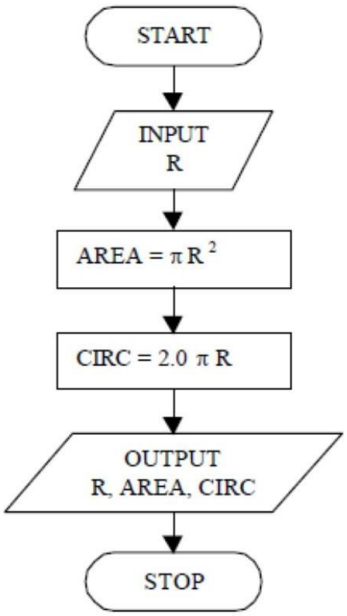
```
clear
clc
x = input('Enter an array of positive numbers only:');
for n=1: length(x)
if x(n) < 0
  fprintf('The data contains invalid values\n')
```

- - - - - - - - - - - - - - - - -

Sheet 6

(1)

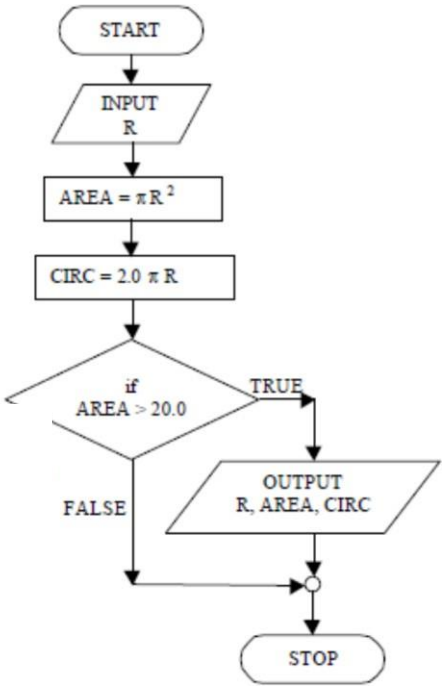
```
%  This program will calculate the
%  area and circumference of a circle,
%  allowing the radius as an input.

R = input('Please enter the radius:  ');

AREA = pi * R^2;

CIRC = 2.0 * pi * R;
```



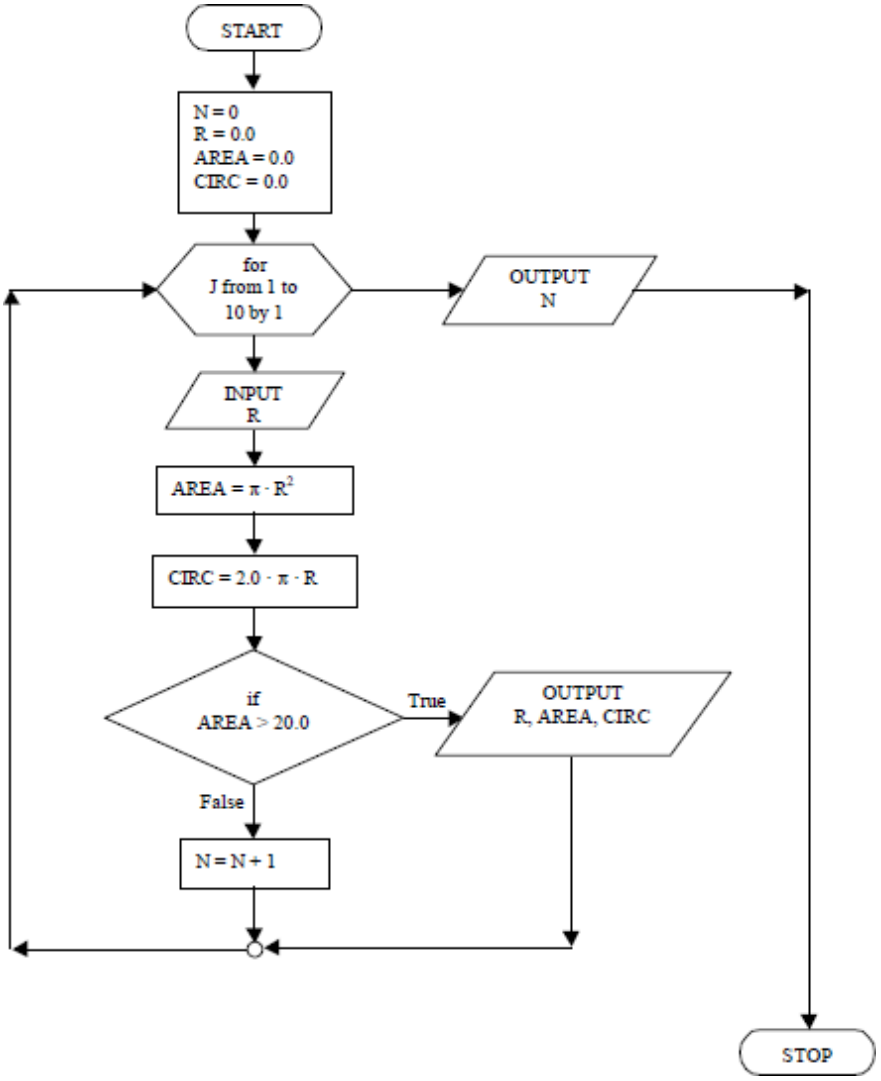
---

(2)

```
%  This program will calculate the
%  area and circumference of a circle,
%  allowing the radius as an input,
%  but will only provide output if the
%  area exceeds 20.

R = input('Please enter the radius:  ');

AREA = pi * R^2;

CIRC = 2.0 * pi * R;

if AREA > 20.0
```



(3)


START
N = 0
R = 0.0
AREA = 0.0
CIRC = 0.0
for
J from 1 to
10 by 1
OUTPUT
N
INPUT
R
AREA = π · R²
CIRC = 2.0 · π · R
if
AREA > 20.0
True
OUTPUT
R, AREA, CIRC
False
N = N + 1
STOP

```
%  This program will calculate the
%  area and circumference of ten circles,
%  allowing the radius as an input,
%  but will only provide output for circles
%  with an area that exceeds 20.

N = 0; R = 0.0; AREA = 0.0; CIRC = 0.0;

for J = 1:1:10

   R = input('Please enter the radius:  ');
   AREA = pi * R^2;
   CIRC = 2.0 * pi * R;

   if AREA > 20.0
      fprintf('\n Radius = %f units',R)
      fprintf('\n Area = %f square units', AREA)
      fprintf('\n Circumference = %f units\n', CIRC)
```

---

(4)

```
%   This program will generate a table of
%   area and circumference values for
%   circles of radii from 1 to 5 inches.

fprintf('\n\n  Table I. Values of circle area and circumference for given circle radii.')

fprintf('\n\n\n      Radius, R            Area, A         Circumference, C\n')

fprintf('       inches           square inches          inches\n')

fprintf('   _____________________________________________________')


for R = 1.0:1.0:5.0

   AREA = pi * R^2;
   CIRC = 2 * pi * R;
```

Table I. Values of circle area and circumference for given circle radii.

Radius, R inches	Area, A square inches	Circumference, C inches
1.0	3.1	6.3
2.0	12.6	12.6
3.0	28.3	18.8
4.0	50.3	25.1
5.0	78.5	31.4

Sheet 7

1. Calculate the following:

a=log(5)
b=e^5
c=$\log_{10}(5)$
d=$\sqrt{5}$
e=(e^5- e^{-5})/2

```
clear
clc
x=5;
a=log(x)
b=exp(x)
```

ans
a = 1.6094
b = 148.4132
c = 0.6990
d = 2.2361
e = 1.1752

- - - - - - - - - - - - - - - - -

2. Expand (x+1)(x+2)

```
syms x
```

ans = x^2+3*x+2

- - - - - - - - - - - - - - - - -

3. Factorize x^2+3x+2

```
syms x
```

ans = (x+1)*(x+2)

- - - - - - - - - - - - - - - - -

4. Simplify 2cos(x)2-sin(x)2

```
syms x
```

ans = many steps then 3*cos(x)^2-1

- - - - - - - - - - - - - - - - -

5. Substitute x=2 in the equation $f=2x^2-3x+1$

```
syms x;
f = 2*x^2 - 3*x + 1;
```

ans = 3

- - - - - - - - - - - - - - - - -

6. Substitute x=3 in the equation $f=x^2*y+5x\sqrt{y}$

```
syms x y;
f = x^2*y + 5*x*sqrt(y);
```

ans = 9*y+15*y^(1/2)

- - - - - - - - - - - - - - - - -

7. Collect the equation $x^2y+yx-x^2-2x$ in respect to x then in respect to y

```
syms x y
coeffs_x = collect(x^2*y + y*x - x^2 - 2*x, x)
```

ans:
coeffs_x =(y-1)*x^2+(y-2)*x
coeffs_y =(x^2+x)*y-x^2-2*x

- - - - - - - - - - - - - - - - -

8. Take the first derivative of $\sin(x)^2$

```
syms x
f = sin(x)^2;
```

ans = 2*sin(x)*cos(x)

- - - - - - - - - - - - - - - - -

9. Take the first derivative of $\sin(x)^2+\cos(y)^2$ with respect to y

```
syms x y
f = sin(x)^2 + cos(y)^2;
```

ans = -2*cos(y)*sin(y)

- - - - - - - - - - - - - - - - -

10. Take the second derivative of $\sin(x)^2+\cos(y)^2$ with respect to y

```
syms x y
f = sin(x)^2 + cos(y)^2;
```

ans =2*sin(y)^2-2*cos(y)^2

- - - - - - - - - - - - - - - - -

TXE6324: Computer Applications in Textiles 3

COMPUTER LAB SHEETS

3rd Year/ second Semester

Dr. Moaz Ahmed Samy
TEXTILE ENGINEERING DEPARTEMENT

SHEET 1

```
clc
clear
format  bank
x = (1:0.3:2)'
 [x   log10(x)]
 D = [ 72 134 3.2
      81 201 3.5
      69 156 7.1
      82 148 2.4
      75 170 1.2 ]
 mu= mean(D)
sigma=std(D)
medi=median(D)
 %help stats
```

```
x =     1.00
        1.30
        1.60
        1.90
ans =   1.00         0
        1.30    0.11
        1.60    0.20
        1.90    0.28
D =    72.00   134.00    3.20
       81.00   201.00    3.50
       69.00   156.00    7.10
       82.00   148.00    2.40
       75.00   170.00    1.20
```

```
  clc
a=[1, 2; 3,4]
a=[1 2; 3 4]
a=[1 2
    3 4]
b=[1 2 9]
b(4)=5
b(6)=15
b(7:10)=[66 88 55 44]
b(2)=6
b(2:3)=[0 0]
```

```
a =    1.00        2.00
           3.00        4.00
a =    1.00        2.00
           3.00        4.00
a =    1.00        2.00
           3.00        4.00
b =    1    2    9
b =    1    2    9    5
```

```
b(10)=[]
b(2:3)=[]
b(5)
b(5:7)
max(b)
min(b)
sum(b)
prod(b)
```

```
Previous answer
b =    1    0    0    5    0   15   66   88   55   44
```

```
b =    1    0    0    5    0   15   66
88   55
b =    1    5    0   15   66   88
55
ans =      66.00
ans =      66.00      88.00
55.00
```

```
%product each element in
a column is multiplied.
%b =     1     2     9
         2     4     6
ans =    2     8    54
```

But if it is a vector, all elements are multiplied.

```
clear
clc
a=[1 15 2 11
    23 1 4   5
    3   1 15 7
    1   4  9 10]
b=max (a)
max(b)
c=min (a)
min(c)
```

```
a =    1   15    2   11
      23    1    4    5
       3    1   15    7
       1    4    9   10
b =   23   15   15   11
ans =   23
```

Previous answer

```
a =    1   15    2   11
      23    1    4    5
       3    1   15    7
       1    4    9   10
```

```
d=sum (a)
sum(d)
e=prod (a)
prod(e)
f=diag (a)
sum(f)
prod(f)
```

```
d = 28    21    30    33
ans =  112
e = 69          60        1080        3850
ans =  56925
```

```
g=sort(a)
%sort each number in the
column ascendingly
h=sortrows(a)
% sort each row as a
block ascendingly
i=diff(a)
%Canceled
```

Previous answer

```
a =    1   15    2   11
      23    1    4    5
       3    1   15    7
       1    4    9   10

g =    1    1    2    5
       1    1    4    7
       3    4    9   10
      23   15   15   11
```

```
clc
clear
f=[1 2 3]
g=[4 5 6]
s=[f,3.5,g]
a=[1   2   3    4
    5   6   7    8
    9  10 11  12
   13 14 15 16]
b=a(4:-1:1,:)
c=a(:,[2,1,2,1])
```

```
f =    1    2    3
g =    4    5    6
s =    1.0000    2.0000    3.0000    3.5000
4.0000    5.0000    6.0000
a =    1    2    3    4
       5    6    7    8
       9   10   11   12
      13   14   15   16
```

```
a(2,:)=[]
d=rot90(a)
%counterclockwise
reshape(d,2,6)
e={1 2 3}
%Canceled
```

Previous answer

```
a =   1    2    3    4
      5    6    7    8
      9   10   11   12
     13   14   15   16
```

```
a =    1    2    3    4
       9   10   11   12
      13   14   15   16

d =    4   12   16
       3   11   15
       2   10   14
       1    9   13
```

```
clc
clear
A = magic(3)
B = A
B(1,1) = 0
A == B
isequal(A, B)
```

```
A =    8.00    1.00    6.00
       3.00    5.00    7.00
       4.00    9.00    2.00
B =    8.00    1.00    6.00
       3.00    5.00    7.00
       4.00    9.00    2.00
B =       0    1.00    6.00
       3.00    5.00    7.00
       4.00    9.00    2.00
```

```
clc
clear
a='mo'
b='so'
a=['mo' 'so']
A = magic(2)
B = A
B(1,1) = 0
A==B
isequal(A, B)
 switch isequal(A,B)
    case true
       display('equal')
    case false
       display('inequal')
end

if isequal(A,B)==true
      display('equal')
elseif isequal(A,B)==false
      display('inequal’)
end
%Canceled
```

```
a =mo
b =so
a =moso
A =    1    3
       4    2
B =    1    3
       4    2
B =    0    3
       4    2
```

```
clear
clc
a = [12, 3, 45, 4, 6]
b = [1, 0, 1]
b = logical([1, 0, 1])
a(b)
%Canceled
c = a(a>3)
a(a>10) = 99
 for i = 1:length(a)
  if a(i) > 10
  a(i)=99;
  end
 end
 a
```

```
a =   12    3   45    4    6
b =    1    0    1
b =    1    0    1
ans =    12   45
%Canceled
c =   12   45    4    6
```

```
M=[4   9  81
    .01 .1  1
    .05 16 -9]
M(M > 0.1) = sqrt(M(M > 0.1))
S=[ 4   9   81
   .01  .1   1
   .05  16  -9]
[m,n] = size(S)
for ii = 1:m
for jj = 1:n
if S(ii,jj) > 0.1
S(ii,jj) = sqrt(S(ii,jj));
end
end
end
S
```

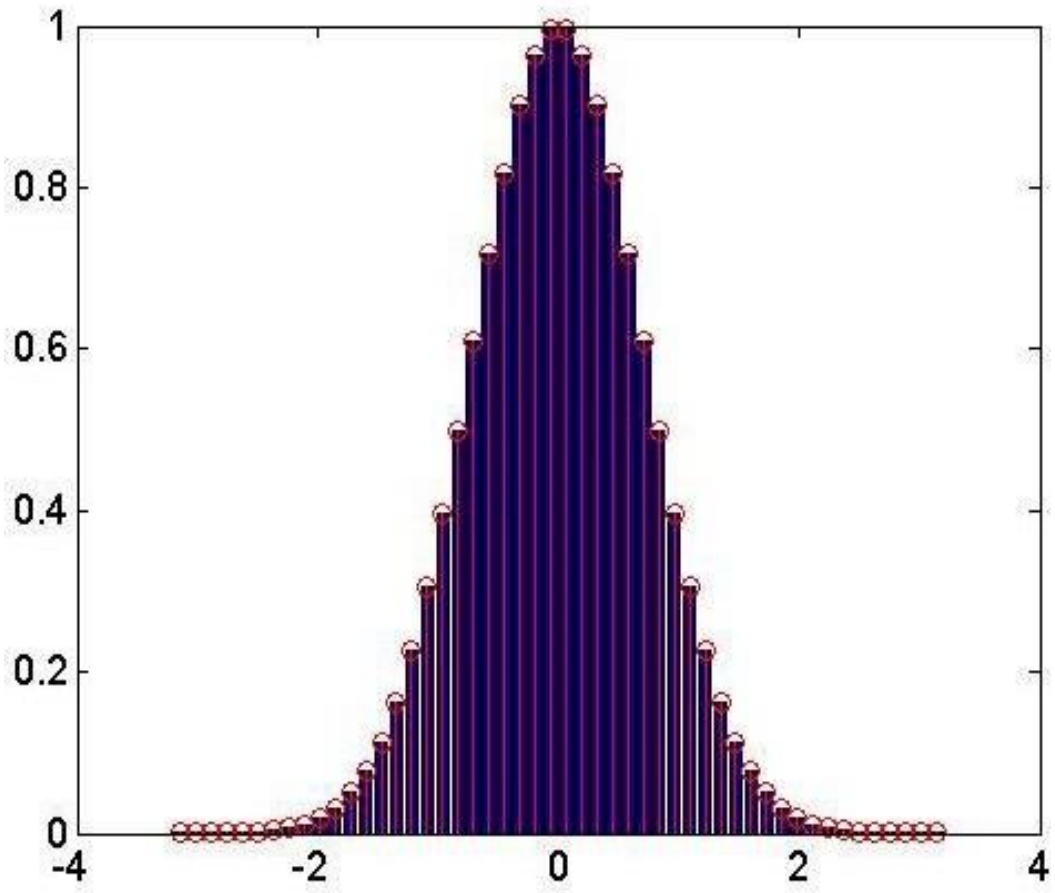
```
M =   4.0000   9.0000  81.0000
      0.0100   0.1000   1.0000
      0.0500  16.0000  -9.0000
M =   2.0000   3.0000   9.0000
      0.0100   0.1000   1.0000
      0.0500   4.0000  -9.0000
S =   4.0000   9.0000  81.0000
      0.0100   0.1000   1.0000
      0.0500  16.0000  -9.0000
```

```
A = [1 2 3; 4 5 6]
B = A(A>2)
A=A(:)
%Convert to one column.
```

```
A =   1.00   2.00   3.00
      4.00   5.00   6.00

B =   4.00
      5.00
      3.00
      6.00
```

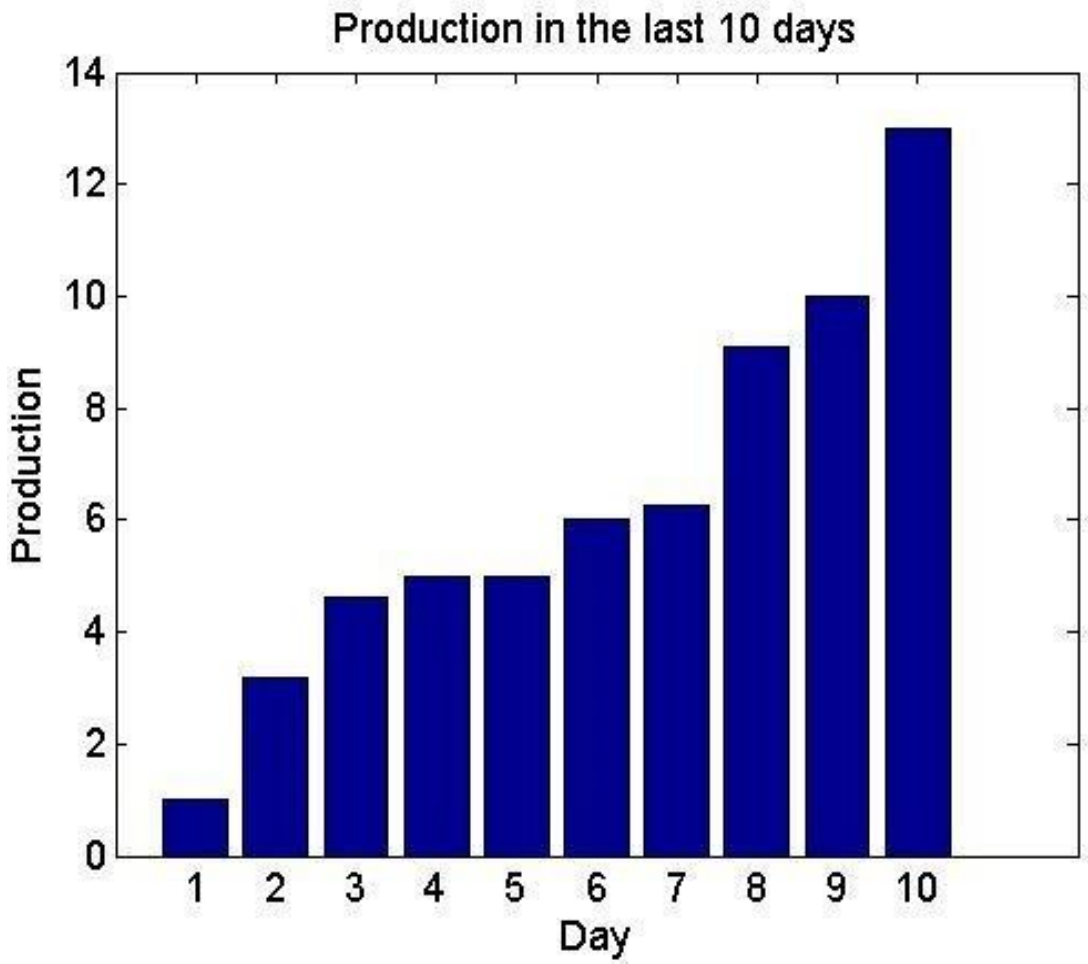
SHEET 2

Write a script to create a bar chart of the equation, e^{-x^2}, over the range (-π, π). Then add a red marker for each bar



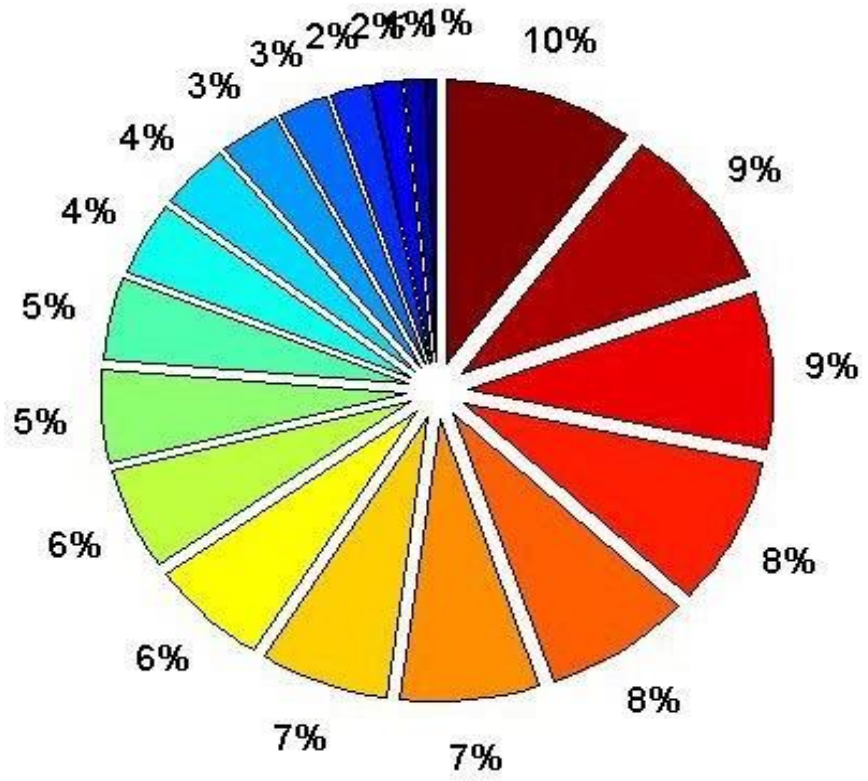

```
clc
clear
close all
x=linspace(-3.14,3.14,50);
y=exp(-x.*x);
%OR y=exp(-x.^2);
%must use .
```

Write a script to create a bar chart of the cloth production over 10 days: [3.2 ,4.6, 6, 9.1, 1, 10.1, 13 ,5, 5, 6.25].The code sorts the data in ascending order.

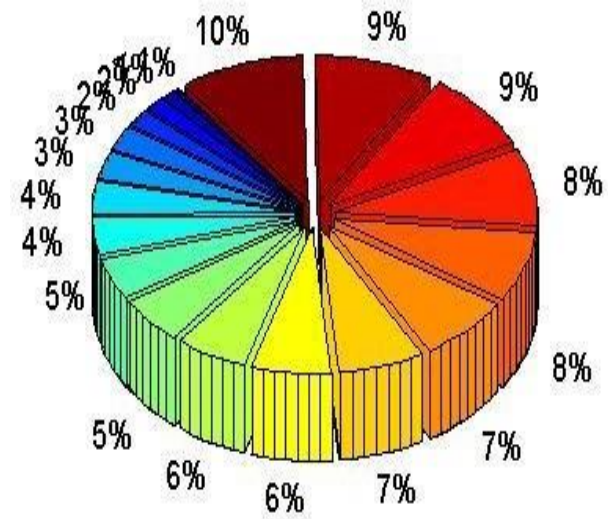



```
clc
clear
close all
production=[3.2 4.6 6 9.1 1 10.1 13
5 5 6.25];
production_new =
sort(production,'ascend');
figure(1)
x=1:10;
```

Plot the equation, y=e^x sinx, in a pie chart, choose any range

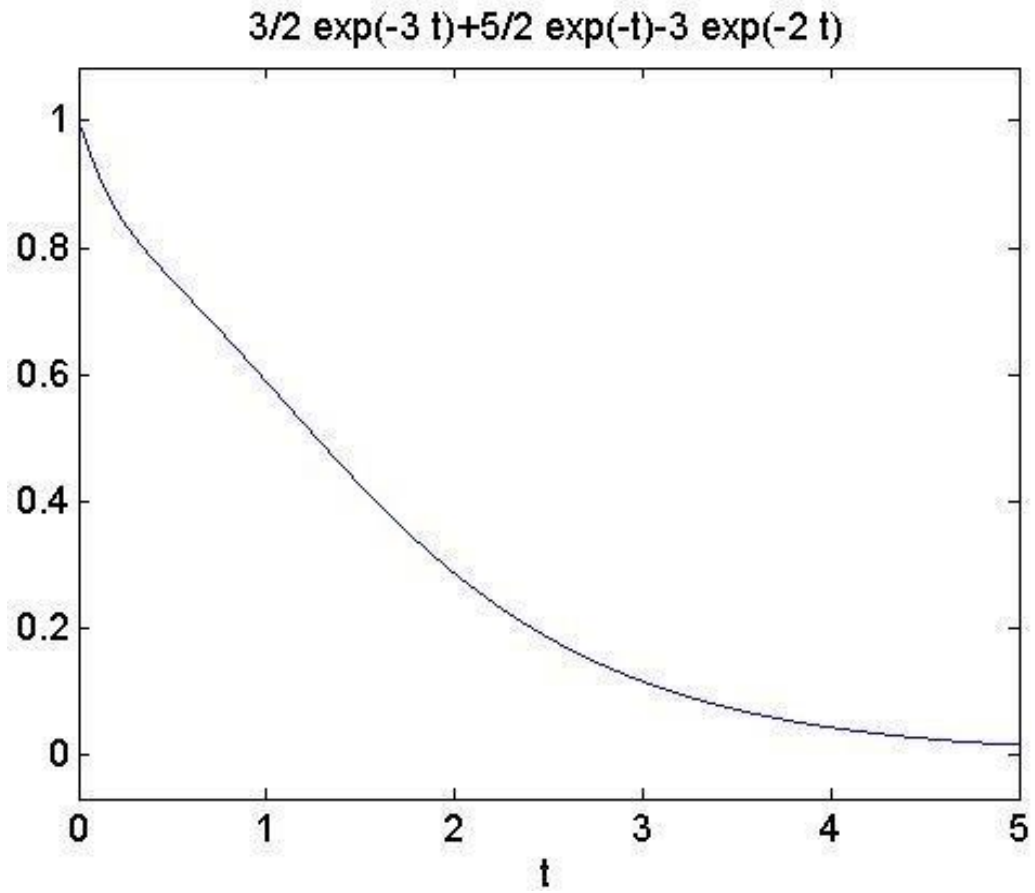



```
clc
clear
close all
x=linspace(0,2*pi,20);
y=sin(x).*exp(x);
figure(1)
pie(x,y)
```



Draw the solution of the following differential equation: at the range t = 0 to 5

D2y+4Dy+3y=3*e-2t, where y(0)=1 and Dy(0)=-1




```
clc
clear
close all
syms y t
y=dsolve('D2y+4*Dy+3*y=3*exp(-2*t)', 'y(0)=1', 'Dy(0)=-1')
```

```
%another solution
%t=linspace(0,5);
%y=eval(vectorize(y));
%plot (t,y)
Ans
y = 3/2*exp(-3*t)+5/2*exp(-t)-3*exp(-2*t)3/2 exp(-3 t) + 5/2 exp(-t) - 3 exp(-2 t)
```

Below are two equations, which calculate the cost of a knitted fabric. Solve those two second order differential equations with initial conditions to find the relationship between time t and cost of manufacturing x and cost of raw material p:

$$2\frac{d^2x}{dt^2}x + \frac{dx}{dt} + 8x = 1, \quad \frac{dp}{dt} = -p - 17x,$$

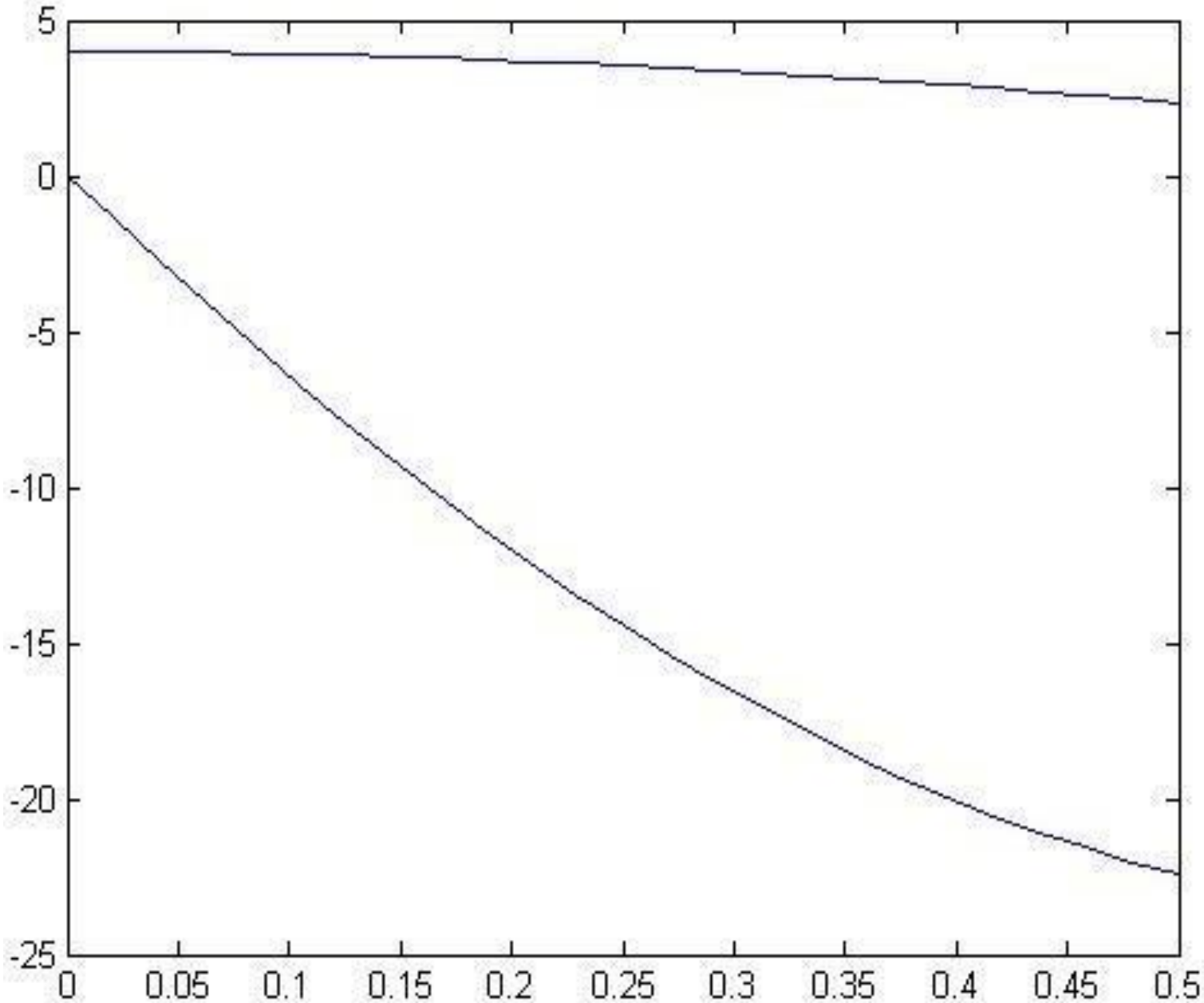
where $x(0) = 4$, $\frac{dx}{dt}(0) = 0$, and $p(0) = 0$

Then plot the answer in the range of 0 to 0.5.

```
clc
clear
close all
[p,x]=dsolve('2*D2x+Dx+8*x=1','Dp=-p-17*x',
'x(0)=4', 'Dx(0)=0','p(0)=0')
t=linspace(0,.5,20);
pp=vectorize(p);
ppp=eval(pp);
plot(t, ppp)
```

Ans

```
p =-527/72*cos(3/4*7^(1/2)*t)*exp(-1/4*t)-
5797/504*exp(-1/4*t)*sin(3/4*7^(1/2)*t)*7^(1/2)-
17/8+85/9*exp(-t)
  x =1/8+exp(-
1/4*t)*(31/168*sin(3/4*7^(1/2)*t)*7^(1/2)+31/8*cos(
3/4*7^(1/2)*t))
```


5
0
-5
-10
-15
-20
-25
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
0.45
0.5

SHEET 3

Write a code to create two random integer numbers then check whether they are equal or not by using switch statement.

```
clc
clear
x=randint(1,1);
y=randint(1,1);
switch x==y
    % 'x==y' is wrong
    % only if x is string, so 'x'
    case 1
        display ('equal’)
```

```
Ans
x =     1
y =     0
inequal
```

What is the output of the following code

```
clc
clear
grade = 'B';
switch(grade)
case 'A'
fprintf('Excellent!\n' );
case 'B'
fprintf('Well done\n' );
case 'C'
fprintf('You passed\n' );
case 'D'
fprintf('Better try again\n' );
otherwise
fprintf('Invalid grade\n' );
end
```

Ans

What is the output of the following code

```
clc
clear
a = 100;
b = 200;
switch(a)
case 100
fprintf('This is part of outer switch
%d\n', a );
switch(b)
case 200
fprintf('This is part of inner switch
%d\n', a );
end
end
fprintf('Exact value of a is : %d\n', a );
fprintf('Exact value of b is : %d\n', b );
```

Ans

This is part of outer switch 100

This is part of inner switch 100

SHEET 4

Write a code adds the value of 1

forever using while loop

```
clear
clc
%to exit the execution of the
command ctlr+c
% do no RUN if there is still a code
is running
 n = 1;
  total = 0;
  while n <= 2
```

Write a code keeps displaying a message “Hello World!” forever using while loop

```
while 1
fprintf('Hello World! \n’)
```

```
%infinite loop, to quit: click the command window to activate it then Ctrl+C
%if while 0: Nothing is going to happen
```

Write a code sums the number from 1 to 50 using While loop

```
clc
clear
total=0;
n=0;
while total<=50
n=n+1;
total=total+n;
end
```

```
Ans
total=55
n=10
```

Using While loop, create a code that asks the user to enter the yarn production at 2019 and the growth rate. Then the code calculates the yarn production yearly after 2019. The code stops when the yarn production reaches 3 times the yarn production at 2019.

Below an example of the output.

Enter 2019 yarn production = 10
Growth Rate % : 50

Year	yarn production
2019.00	10.00
2020.00	15.00
2021.00	22.50
2022.00	33.75

```
clc
clear
format bank
x=input('Enter 2019 yarn
production: ');
y=input('Growth Rate %: ');
year=2019;
z=x;
disp('Year   yarn
production ')
disp([2019, x])
while (z<=3*x)
year=year+1;
```

Create a code that asks the user to enter an array. The code shows only the positive numbers using While loop and If statement.

```
clc
clear
x = input('Enter an array:');
display('Positve numbers only are')
n = 1;
while n <= length(x)
if x(n) > 0
fprintf('%0.1f ', x(n));
end
```

```
ans
Enter an array: [1 2 3 -8 -7 -6 0]
Positve numbers only are 1.0  2.0  3.0
```

Construct a code asks the user to enter any number from 1 to 10. By using while loop, if the user enters any other number, the question is repeated. If the user enters a number in the given range, the code exits.

```
clear
clc
v = 1;
while v
choice = input('Please enter
a number between 1 and 10:
')
if  choice >=1 && choice <=
10


%program will continue
asking until you enter
number between 1 and 10
% if v=0 it won't run
```

Using while statement, write a code keeps asking the user to enter a radius of a circle and calculates its area (area=pi*r^2). The code does not show the area unless it is higher than 20. At the end, a message appears telling how many circles their area are less than 20. The code ends when the user enters 0 for the radius.

```
clear
clc
n=0;
r=input('\nRaduis? ');
while r>0
area=pi*r^2;
if area>20
fprintf('\nArea=%0.2f', area);
else
n=n+1;
end
r=input('\nRaduis? OR 0 to exit?
');
```

To classify the cotton grades according to the length uniformity, the following table has been used. Write a code asks the user to enter the number of cotton samples, and its corresponding uniformity. Use While loop to let the user re-enter the score if its value is less than 0 or greater than 100. Use If statement to estimate the following: Very high percentage, high percentage, intermediate percentage, low percentage, very low percentage, overall accepted samples percentage (77 and above), and overall rejected samples percentage (below 77).

Interpreting length uniformity

Description of degree of uniformity	Length uniformity index (percent)
Very high	above 85
High	83–85
Intermediate	80–82
Low	77–79
Very Low	below 77

```
clc
clear
a=0;b=0;c=0;d=0; e=0;
x=input ('Enter The Total Number of cotton
Samples: ');

for v=1:x
    p = input(['Enter the Cotton Grade
Number ' num2str(v) ' Mark: ']);

    while p <0 || p > 100
          display ('Wrong input**ONLY FROM
0 to 100!!!**') ;
     p = input(['Enter the Cotton Grade
Number ' num2str(v) ' Mark: ']);
    end

    if p>=85 && p<=100
        a=a+1;
elseif p>=83 && p<85
        b=b+1;
    elseif p>=80 && p<83
        c=c+1;
    elseif p>=77 && p<80
        d=d+1;
 else
        e=e+1;
 end
end

f=100*(a/x);
fprintf ('\nVery high percentage = %0.1f
%',f)
g=100*(b/x);
fprintf ('\nHigh percentage = %0.1f %',g)
h=100*(c/x);
fprintf ('\nIntermediate percentage = %0.1f
%',h)
i=100*(d/x);
fprintf ('\nLow percentage = %0.1f %',i)
j=100*(e/x);
fprintf ('\nVery low percentage = %0.1f
%',j)
```

ans
Enter The Total Number of cotton Samples: 6
Enter the Cotton Grade Number 1 Mark: 10
Enter the Cotton Grade Number 2 Mark: 75
Enter the Cotton Grade Number 3 Mark: 78
Enter the Cotton Grade Number 4 Mark: 80
Enter the Cotton Grade Number 5 Mark: 83
Enter the Cotton Grade Number 6 Mark: 86

Very high percentage = 16.7
High percentage = 16.7
Intermediate percentage = 16.7
Low percentage = 16.7
Verylow percentage = 33.3
overall rejected samples percentage = 33.3
overall accepted samples percentage = 66.7 >>

SHEET 5

Write a program using EXTERNAL FUNCTION called multiply that produces MxN multiplication table where the user is asked to enter the value of M and N.

```
clear
clc
display ('the multiplication table rows and column')
a=input ('Enter Number of rows: ');
b=input ('Enter Number of columns: ');
multiply(a,b)
% No clc OR clear
function multiply(M, N)
for j = 1:M
for k = 1:N
fprintf('%d ', j*k);
```

Ans

```
the multiplication table rows and column
Enter Number of rows: 2
Enter Number of colomns: 3
1 2 3
2 4 6
```

Write a code calculates the area ($pi*r^2$) and circumference ($pi*2r$) of a circle using an EXTERNAL FUNCTION called circ2. The user is asked to enter the value of the radius.

```
% no capital anywhere
clc
clear
r=input ('\nEnter raduis of circle: ');
[a,b]=circ2(r);
fprintf('\nArea= %.1f',a)
fprintf('\ncircumference= %.1f\n',b)

function [a,b]=circ2(r)
a=pi*r^2;
```

Ans

```
Enter raduis of circle: 5
Area= 78.5
circumference= 31.4
```

Write a code calculates the maximum of 3 numbers entered by the user using an EXTERNAL FUNCTION called mymax.

```
clc
clear
a=input ('\nEnter the first number: ');
b=input ('\nEnter the second number: ');
c=input ('\nEnter the third number: ');
mymax(a,b,c);

function max = mymax(n1, n2, n3)
max = n1;
if(n2 > max)
max = n2;
end
if(n3 > max)
```

Ans

```
Enter the first number: 1
Enter the second number: 2
Enter the third number: 9
Maximum is 9.0
```

Write a function called odd_index that takes a matrix, M, as input argument and returns a matrix that contains only those elements of M that are in odd rows and columns. The user is asked to enter the values of the matrix M.

```
clear
clc
M=input('\n Enter a 4*3 matrix: ')
odd_index(M)

function odd_index(M)
```

```
Ans
 Enter a 4*3 matrix: [1 2 -2;3 4 -4; 5 6 -6; 7 8 -8]
M =    1.00    2.00   -2.00
       3.00    4.00   -4.00
       5.00    6.00   -6.00
       7.00    8.00   -8.00
result =1.00   -2.00
          5.00   -6.00
```

Write a code takes the value of A=[1 2 3 4 5] and by using an EXTERNAL FUNCTION called list_of_even, extracts the even values only.

```
clc
clear
z=1:5;
list_of_even(z)

function list_of_even(z)
for i=1:length(z)
   if rem(z(i),2)==0
  z(i)
```

```
Ans
z =         1.00         2.00         3.00         4.00
5.00
ans =        2.00
ans =         4.00
```

SHEET 6

Find the intersecting point of the two circles: $x^2 + y^2 = 4$, $(x-1)^2 + y^2 = 9$

```
syms x y
 eq1='x^2+y^2=4';
 eq2='(x-1)^2+y^2=9';
 A=solve(eq1,eq2);
```

```
ans=-2
ans=0
```

Another solution

```
[x  y]=solve(eq1,eq2)
x=-2
y=0
```

Solve x-5=0

```
syms x


ans =5
```

Another solution

```
syms x
y = solve('x-5 = 0')
ans
y =5
```

Another solution

```
syms x
solve('x-5')
ans =5
```

Another solution

```
syms x
f='x-5'
solve(f)
ans =5
```

Solve $v-u-3t^2=0$ with respect to v

```
syms v u t
```

```
ans =u+3*t^2
```

Another solution

```
syms v u t
f='v-u-3* t^2=0'
solve(f,v)
ans =u+3*t^2
```

Solve the equation
$x^4-7x^3+3x^2-5x+9=0$.

```
syms x
eq = 'x^4 - 7* x^3 + 3* x^2 - 5* x + 9 = 0';
s = solve(eq)
double (s(1))
double (s(2))
```

Ans

```
s =7/4+1/12*3^(1/2.....
     7/4+1/12*3.....
     7/4-1/12*3^(1/2.....
     7/4-1/12*3^(1/2.....
ans =    6.6304
ans =    1.0598
ans = -0.3451 + 1.0778i
ans = -0.3451 - 1.0778i
```

Find $\int xsin(x)$

```
syms x

ans=sin(x)-x*cos(x)
```

Find $\int a^x \, dx$

```
syms a x
```

```
ans=a^(x+1)/(x+1)
```

```
syms a x
```

Find $\int_3^4 a^x d$

```
ans=(4*4^x-3*3^x)/(x+1)
```

Find $\int_1^2 \frac{1}{x}\,dx$ then evaluate the

answer

```
syms x

b=int(1/x,1,2)
```

Ans

```
b =log(2)

ans =    0.6931
```

Solve $\frac{dy}{dt} + 2y = 12t^2$

```
syms t y;
```

```
ans= 6*t^2-6*t+3+exp(-2*t)*C1
```

Solve $\frac{d^2_y}{d_{t^2}} = c^2 y$

```
syms c y;
```

```
ans= C1*exp(c*t)+C2*exp(-c*t)
```

Solve $\frac{d^2y}{dt^2} = c^2\, y, \quad y(0) = 1$

$$, \frac{dy}{dt}(0) = 0$$

```
syms c y;
```

```
ans =1/2*exp(-c*t)+1/2*exp(c*t)
```

SHEET 7

Plot the following equations. Then shade and calculate the area under curve.

y=-15x+1515 from (100,101)

y=sin(x) from (0,10)

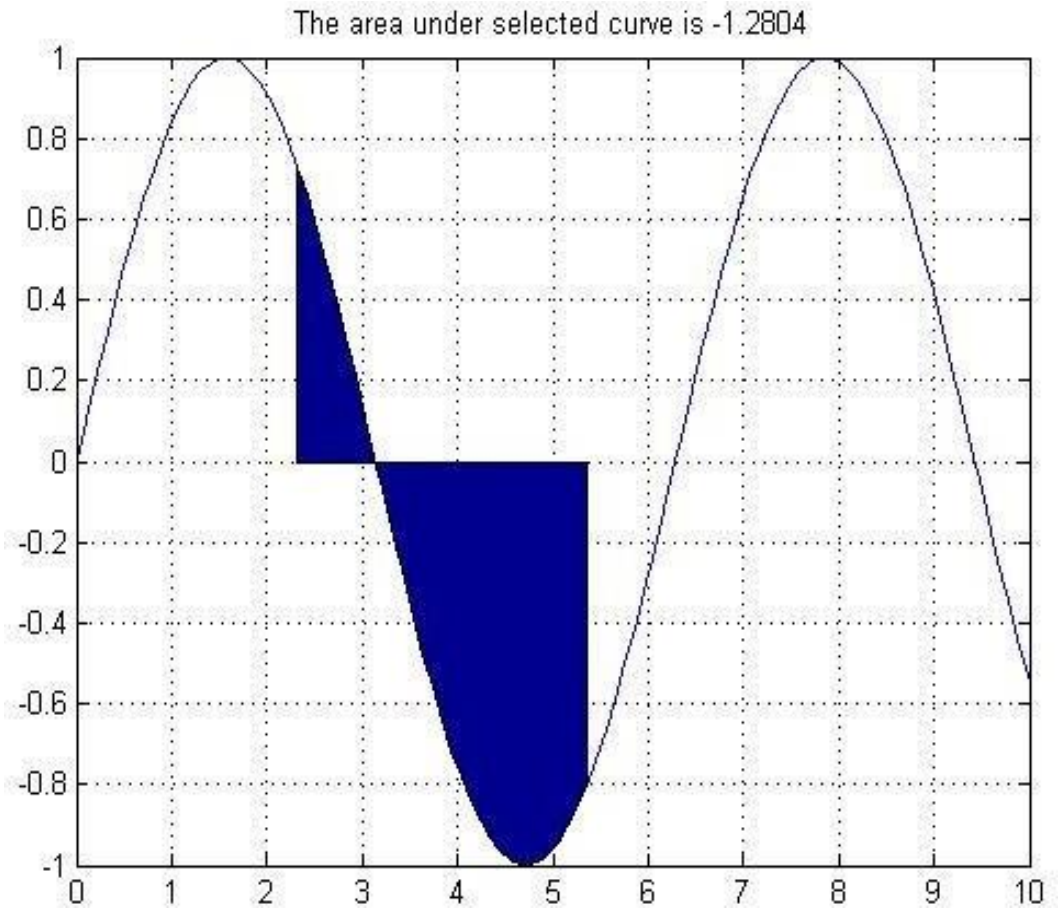
```
clc
clear
close all
 x=linspace(100,101,10);
 y = -15*x + 1515;
figure
area(x,y)
%plot and shade
area=trapz(x,y)
%calculate the area
grid
```

```
clc
clear
close all
x=linspace(0,10);
y=sin(x);
```

```
%plot and shade
```

```
%calculate the area
```

Plot the equations: y=sin(x) from (0,10). Then shade and calculate a selected area by user under the curve.




```
clc
clear
close all
x=linspace(0,10);
y=sin(x);
plot(x,y)
grid
%mark left to right
[m n]=ginput(2);
%ask for 2 points
i=find(x>=m(1) & x<=m(2));
%devide the space of x in-between them
x=x(i);
y=y(i);
hold on
%if you delete hold on it, marked area will be cut
```

Fit the following data in a polynomial equation and find the regression coefficient: x = [1 2 3 4 5 6] & y = [7 8 9 10 11 14]

```
clear
clc
close all
   x =  [1 2 3 4    5    6]
    y = [7 8 9 10 11 14]

      %       Use polyfit to compute a linear regression that predicts y from x:
    p = polyfit(x,y,2);

    % if you want it linear USE p=polyfit(x,y,1)
  % if you want it Polynomial USE p=polyfit(x,y,2) or 3 or greater

 %      Call polyval to use p to predict y, i.e. %evaluate z by sustititing x2 in the equation of z
 yfit = polyval(p,x);
       % plot actual data with points and predicted data with lines or
     % curves
   plot(x,y,'ro',x,yfit,'b:');
     %     Compute the residual values as a vector signed numbers:
     yresid = y - yfit;

     %     Square the residuals and total them obtain the residual sum of squares:
    SSresid = sum(yresid.^2);
    % Compute the total sum of squares of y by multiplying the variance of y by the number of observations minus 1:
%length is function calculates how many number in the y matrix
% var is a matrix calculate the variance of the y matrix
```

ans

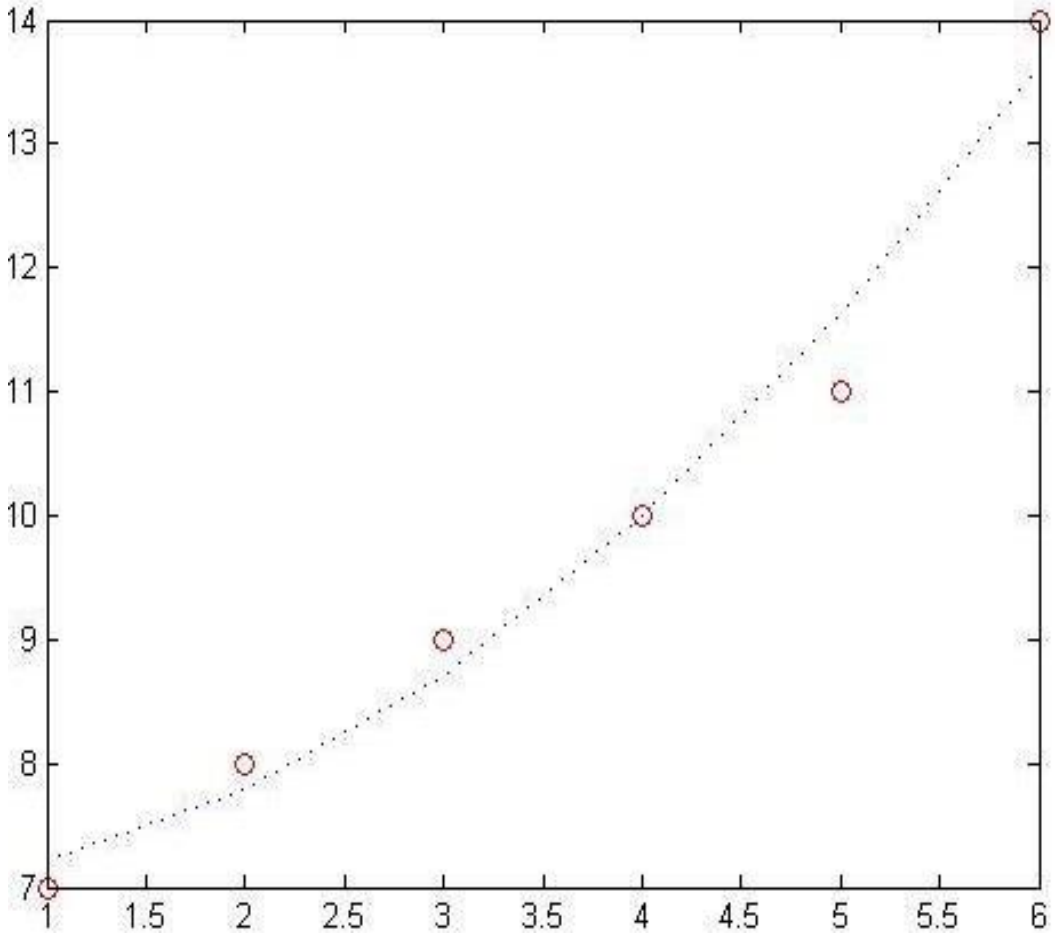
x = 1 2 3 4 5 6

y = 7 8 9 10 11 14

p = 0.1786 0.0357 7.0000

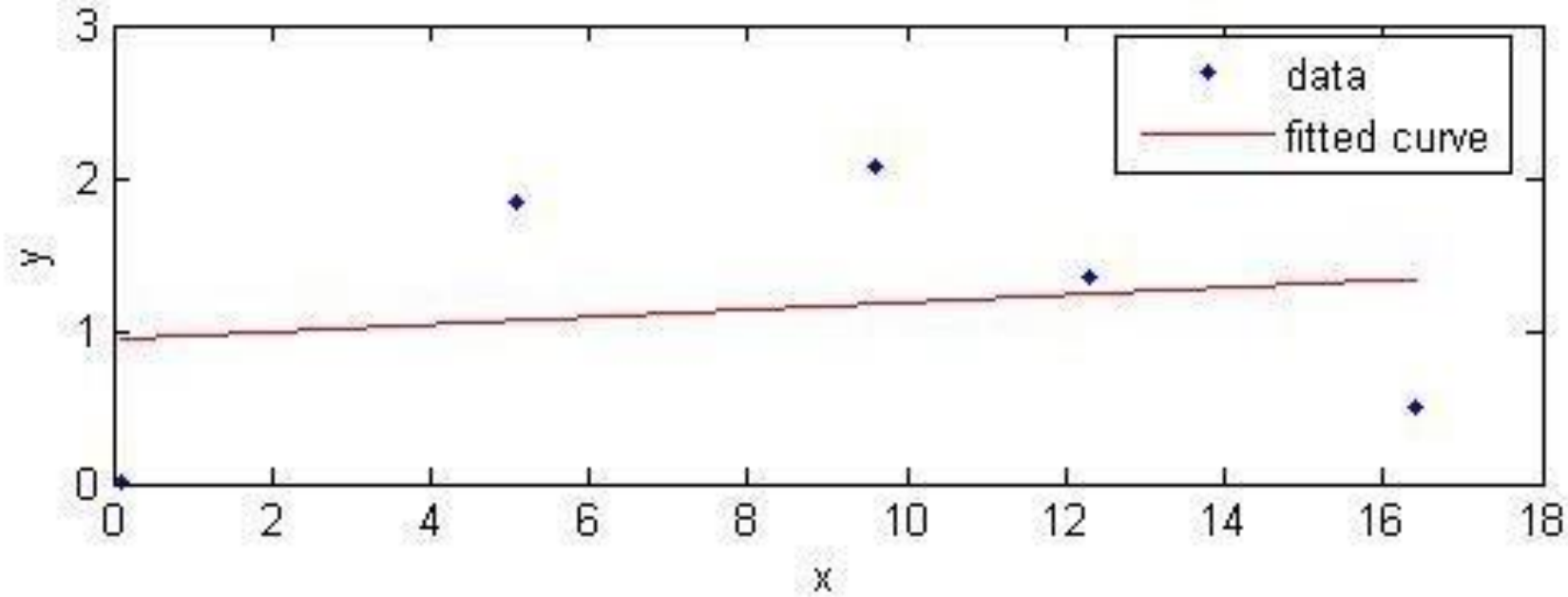
yfit = 7.2143 7.7857 8.7143
10.0000 11.6429 13.6429

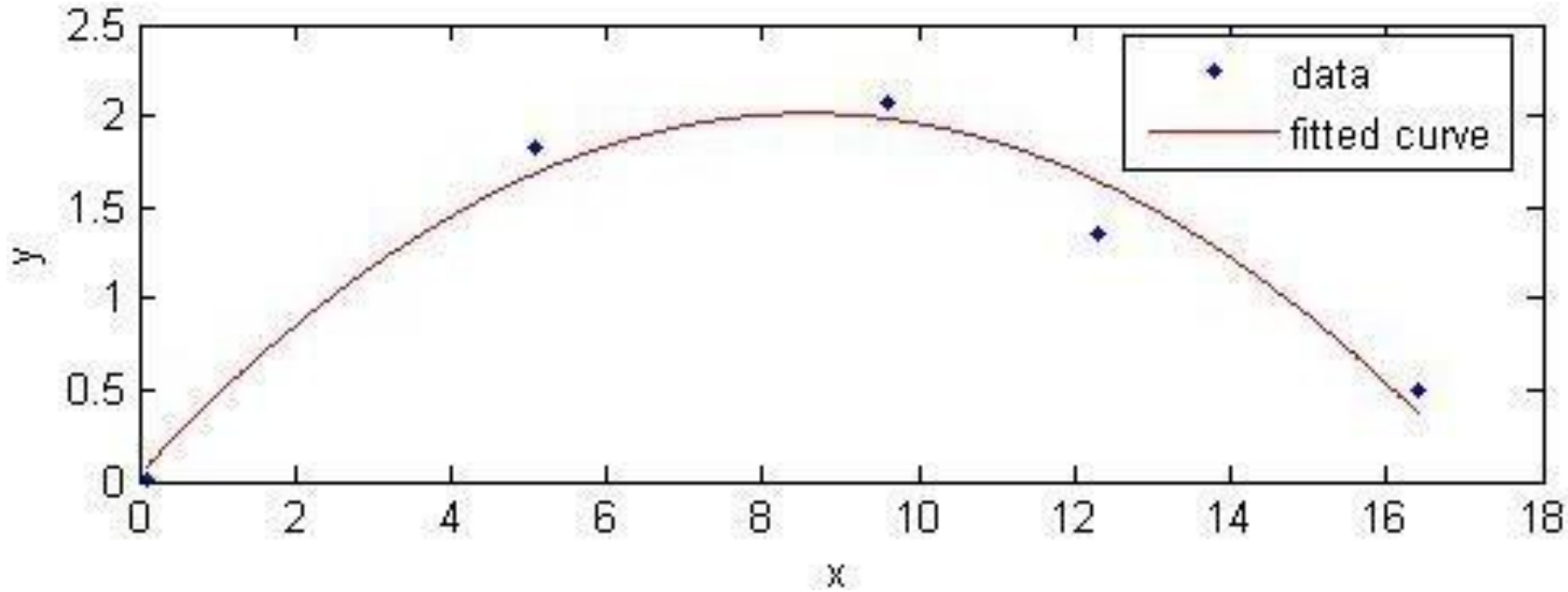
Regression_coeffecient =
0.9768



Fit the following data in both linear and polynomial equation and find the equation:
x = [0.1; 5.1; 9.6; 12.3; 16.4] & y = [0.01; 1.83; 2.08; 1.36; 0.49]

```
close all
clc
clear
x = [ 0.1;  5.1;  9.6; 12.3; 16.4 ];
y = [0.01; 1.83; 2.08; 1.36; 0.49];

%cftool if needed
f1 = fit( x, y, 'poly1' )
%works with column vectors only
f2 = fit( x, y, 'poly2' )
```


data
fitted curve
y
x
0
1
2
3
0
2
4
6
8
10
12
14
16
18


data
fitted curve
y
x
0
0.5
1
1.5
2
2.5
0
2
4
6
8
10
12
14
16
18

Ans

f1 = Linear model Poly1: f1(x) = p1*x + p2

Coefficients (with 95% confidence bounds):

p1 = 0.02417 (-0.228, 0.2763)

p2 = 0.9437 (-1.673, 3.56)

f2 = Linear model Poly4:

f2(x) = p1*x^4 + p2*x^3 + p3*x^2 + p4*x + p5

Coefficients:

p1 = 0.0003482

p2 = -0.01044

p3 = 0.06339

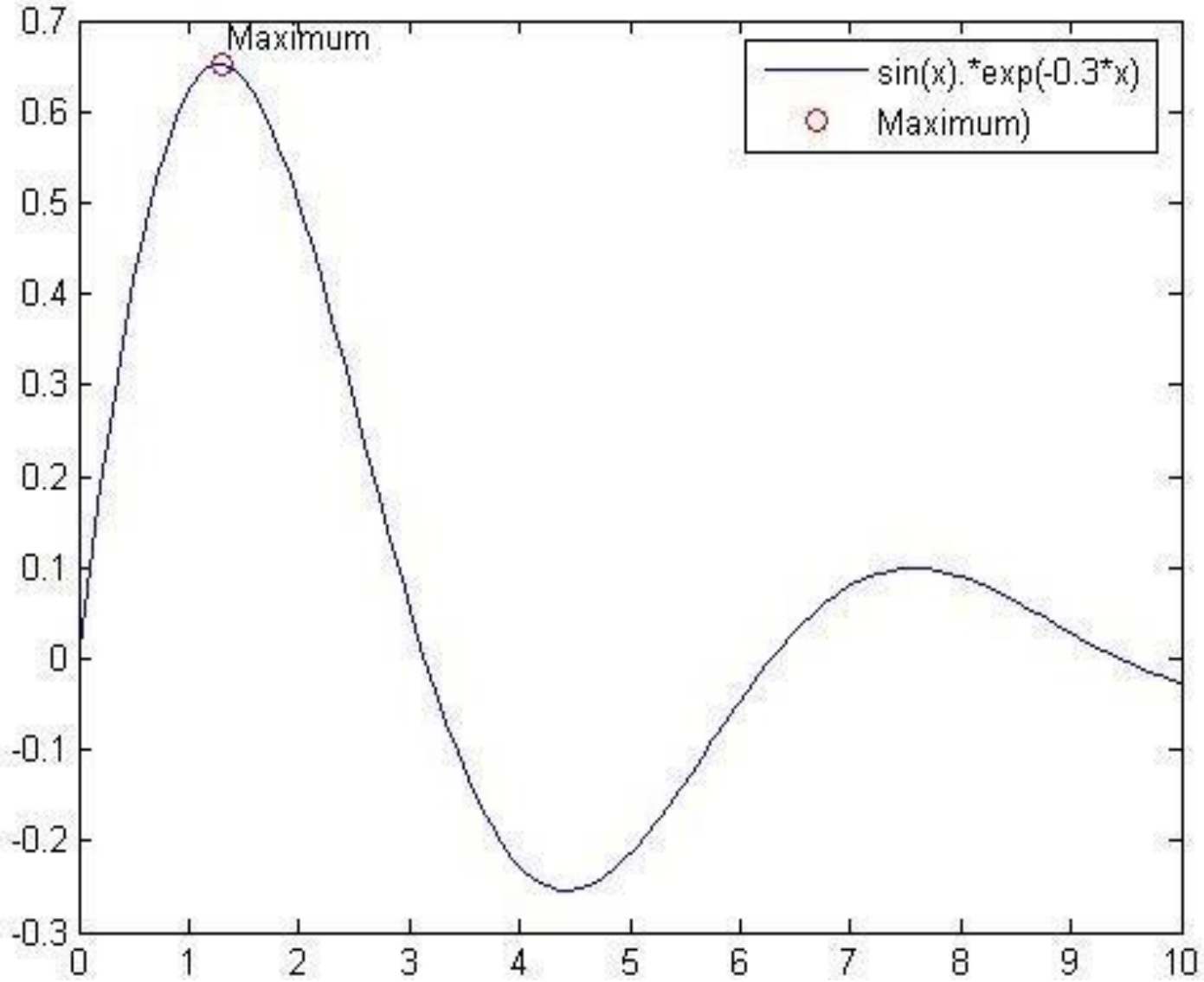
p4 = 0.2643

p5 = -0.01706

Find and mark the maximum of the function $y=\sin(x)e^{-0.3x}$ Over the range (0,10).

```
clear
clc
close all
x=linspace(0,10);
y=sin(x).*exp(-0.3*x);
ymax=max(y)
%seach for x at the ymax
k=find(y==ymax)
%this find the index of y where it is
maximum
```

Ans
ymax = 0.6515
k = 7
xmax = 1.2245



SHEET 8

Read the following data then calculate the sum of each column from a data file called sum_data and has a variable called fabric which contains the following table

Fabric 1	Fabric 2
1510	1520
13	14
0.13	0.12
0.35	0.4

To create a data file:New M file (extension .mat) + New variable (fabric) + open it + copy data + paste + save data file (sum_data)

New M file (extension .m)

```
clc
clear
load sum_data
for i=1:2
a=fabric(1,i);
b=fabric(2,i);
c=fabric(3,i);
d=fabric(4,i);
```

Ans

```
total =    1523.5    1534.5
```

A yarn was tested 5 times to obtain the stress-strain curves from a data file called `average_curve_data` and has a variable called full_data. Below is ONLY a sample of the data. Find the average curve.

elongation	0	0.1	0.4	0.8	16.4	16.7	19.4	0	0	0
Tenacity	1.19	1.27	….	….	40.08	40.4	41.75	0	0	0
elongation	0	0.3	0.4	0.6	14.9	15.4	18.4	21.9	0	0
Tenacity	1.01	1.08	….	….	47.91	48.2	49.71	50.29	0	0
elongation	0	0.3	0.4	0.6	15.1	15.4	0	0	0	0
Tenacity	1.01	1.37	….	….	45.68	45.76	0	0	0	0
elongation	0	0.3	0.4	0.8	15.1	0	0	0	0	0
Tenacity	0.97	0.97	….	….	42.79	0	0	0	0	0
elongation	0	0.3	0.4	0.6	13.9	14.6	17.2	18.4	22.2	0
Tenacity	1.05	1.28	….	….	41.2	41.73	43.38	43.98	45.41	0

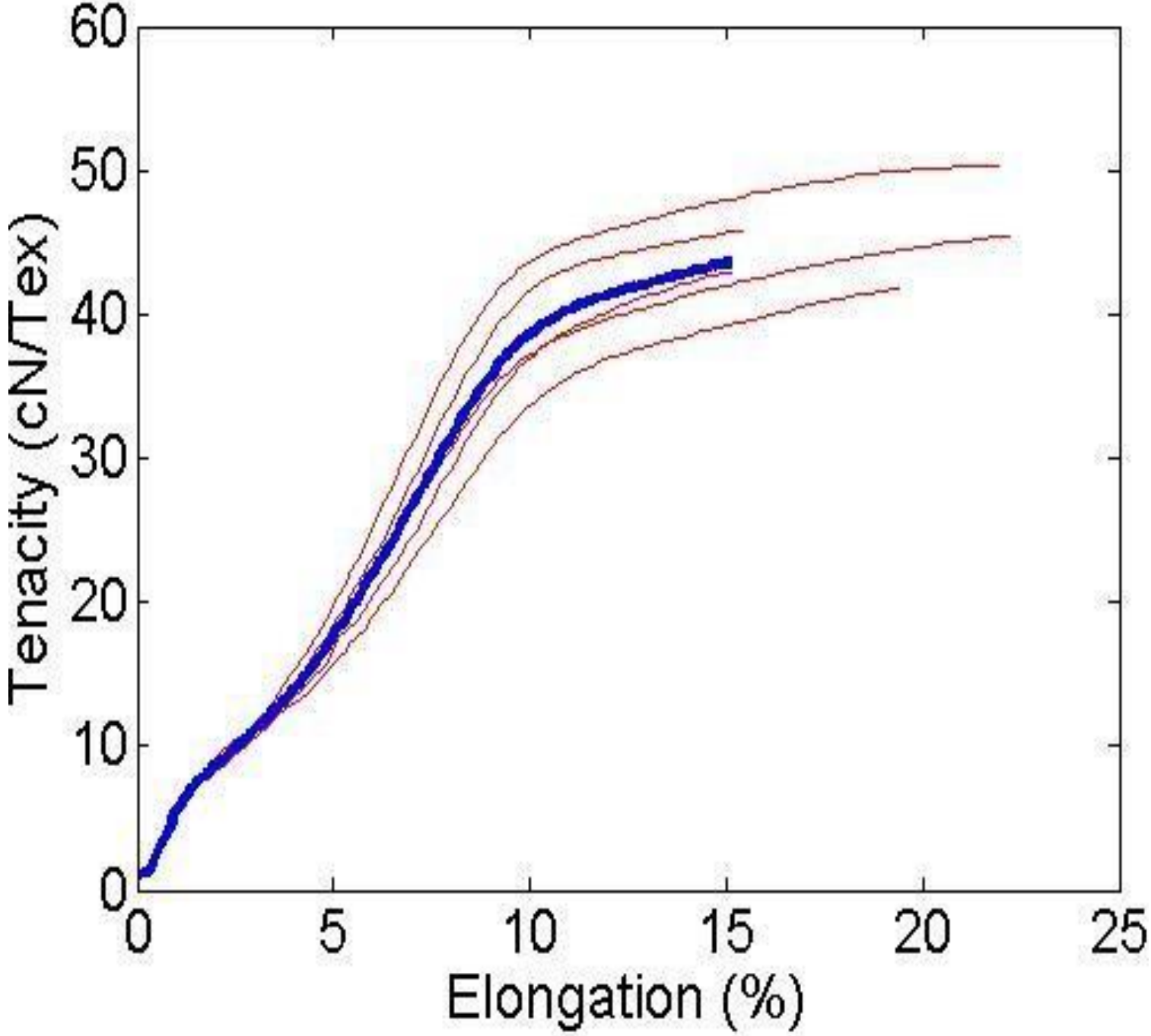
New M file (extension .m)

```
clear
clc
close all
load average_curve_data
 % full data should be arranged in rows: elongation first then
corrosponding force
 % step1: calculate the min value of the elgation at break
 [M,I] = max(full_data,[],2);
 % maximum of each row
 %M: max value, I: location
 elongation_at_break = M(1:2:end,:) ;
 % maximum value of elongation for each curve
 k=min(elongation_at_break);
% the weakest yarn
```

```
 % step2: make a scale for average curve only till the
weakest yarn
x_fixed=[0:0.1:k];
  % step3: create a new matrix for each curve till the break
 x1=full_data(1,1:I(1));
y1=full_data(2,1:I(1));
%because I (1) ~=I(2)
x2=full_data(3,1:I(3));
y2=full_data(4,1:I(3));
x3=full_data(5,1:I(5));
y3=full_data(6,1:I(5));
x4=full_data(7,1:I(7));
y4=full_data(8,1:I(7));
x5=full_data(9,1:I(9));
y5=full_data(10,1:I(9));
```

```
 % step4: Craete a new y scale for each curve to enable finding
the average
y1new = interp1(x1,y1,x_fixed);
%Now
%x1=         0            0.1       0.4       0.8
%y1=         1.19     1.27     1.75     3.89
% I need
%x_fixed=0           0.1       0.2        0.3
%y1new= 1.19     1.27     1.43     1.59

y2new = interp1(x2,y2,x_fixed);
y3new = interp1(x3,y3,x_fixed);
y4new = interp1(x4,y4,x_fixed);
y5new = interp1(x5,y5,x_fixed);
y1new = interp1(x1,y1,x_fixed);
y2new = interp1(x2,y2,x_fixed);
```

```
 % step5: plotting
 y_average=mean([y1new(:) y2new(:)   ......
     y3new(:)   y4new(:)   y5new(:)      ]') ;
      final_result=[x_fixed ;y_average];
   set(0,'DefaultAxesFontSize',18,'DefaultTextFontSize',18);
    plot(x1,y1, 'r-');
hold on
plot(x2,y2, 'r-');
plot(x3,y3, 'r-');
plot(x4,y4, 'r-');
plot(x5,y5, 'r-');
 % alternitively
%for i=1:2:10
%r=full_data(i,1:I(i));
%t=full_data(i+1,1:I(i));
%plot(r,t)
%hold on
%end
 xlabel('Elongation (%)');
ylabel('Tenacity (cN/Tex)');
 plot(x_fixed,y_average, 'b-','LineWidth',3);
```


Tenacity (cN/Tex)
Elongation (%)
0
10
20
30
40
50
60
0
5
10
15
20
25

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