Eric Jiang - 158002948

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Lab 1 - Section C2 6/2/2017

getting Started

```
theta = 45*pi/180
a = sin(theta)
b = cos(theta)
c = a^2+b^2
```

```
theta =

    0.7854
```

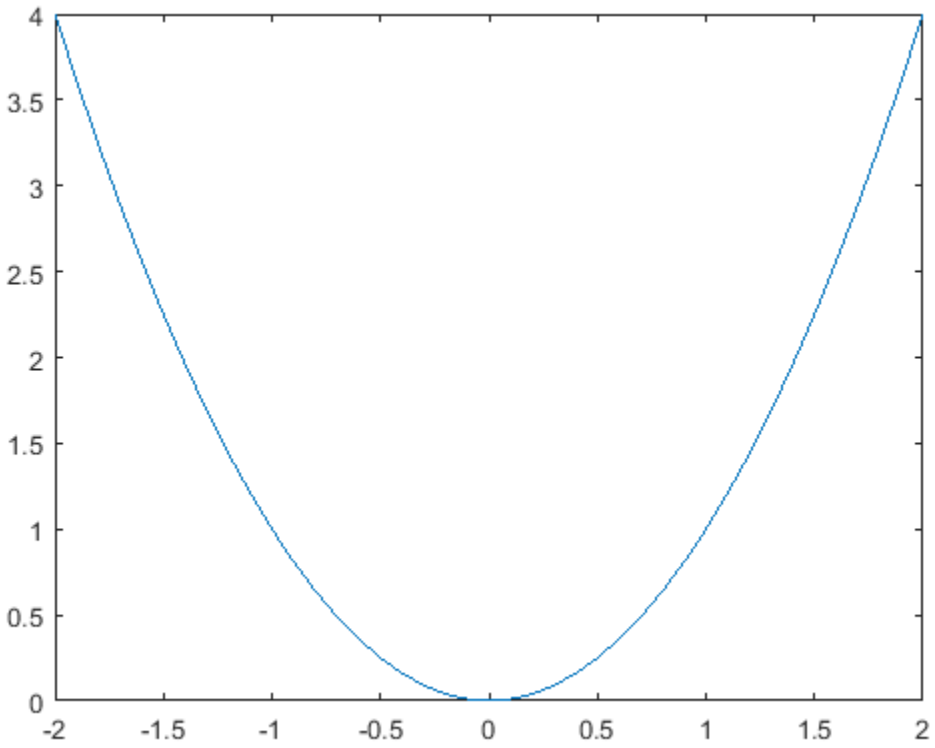
```
a =

    0.7071
```

```
b =

    0.7071
```

```
c =

     1
```

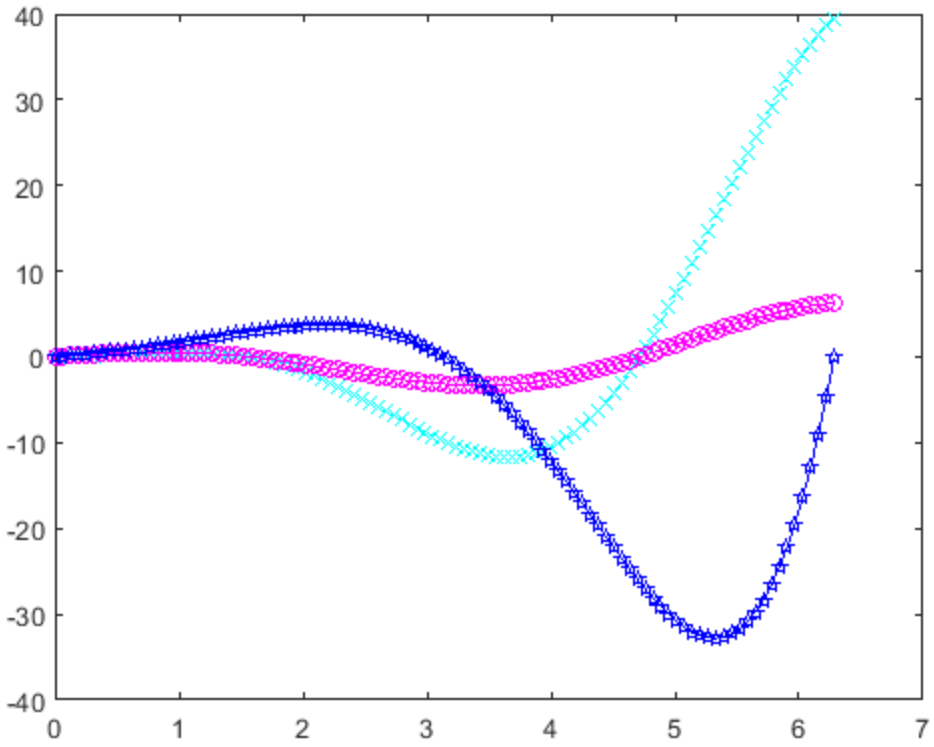
plotting y(x) = x^2 -2 <= x<= 2

```
x = -2:.1:2; % step increment by .1
y = x.^2;
figure;
plot(x,y);
```



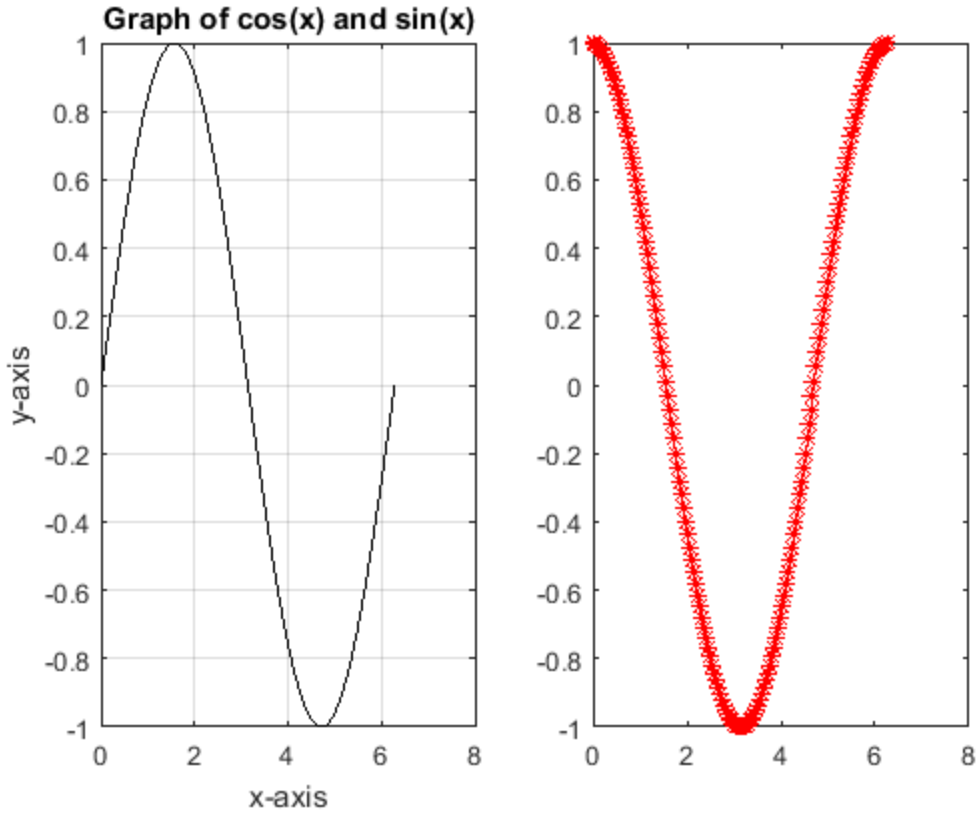
plot(x,y1,x,y2,x,y3)

```
x = linspace(0,2*pi,100);
y = (x.^2).*cos(x);
g = x.*cos(x);
f = (2.^x).*sin(x);
figure;
plot(x,y,'c:x',x,g,'m-o',x,f,'b-p');
```



2 plots on one figure

```
x=linspace(0,2*pi,150);
figure
subplot(1,2,2)
plot(x,cos(x),'r*')
% hold on
subplot(1,2,1)
% first 2 numbers always the same (figure size)
% 3rd number is the location of subfigure
plot(x,sin(x),'k')
% hold off
grid
xlabel('x-axis')
ylabel('y-axis')
title('Graph of cos(x) and sin(x)')
```



if-else statements

```
% x = input('enter a number: ');
if(x>3 & x<5)
        disp('Hello')
elseif(x==2)
        disp('Bye')
else
        disp('Something Else')
end

for x = 1:4
    y = x^2
end
```

```
Something Else

y =

     1


y =

     4
```

```
y =

     9


y =

    16
```

Deriving/Integrating

```
syms x;
f = x.^3;
diff(f,x,2) % 2nd derivative
int(f,x,0,3) % integral from 0 to 3
```

```
ans =

6*x


ans =

81/4
```

Using function file to calculate sum and product

```
A = [12;2];
B = [2;1];
[X,Y] = sumprod(A,B) % calling function: [outputs] = func(inputs)
```

```
X =

    14
     3


Y =

    24
     2
```

Problem 1

```
n = 2*cos(pi)^2+sqrt(4*sin(pi/2))-exp(2)
```

```
n =

   -3.3891
```

Problem 2

```
a = [1 2 3 4 5];
b = [2^-1 2^-2 2^-3 2^-4 2^-5];

%2.1
c = [a b]
l = length(c)

%2.2
product = a.*b

%2.3
c = transpose(b)

%2.4
x = linspace(0,100,101)
y = linspace(0,1,101)

%2.5
xy = x.*y

%2.6
s = sum(x)


c =

  Columns 1 through 7

    1.0000    2.0000    3.0000    4.0000    5.0000    0.5000    0.2500

  Columns 8 through 10

    0.1250    0.0625    0.0313


l =

    10


product =

    0.5000    0.5000    0.3750    0.2500    0.1563
```

```
c =

    0.5000
    0.2500
    0.1250
    0.0625
    0.0313


x =

  Columns 1 through 13

     0     1     2     3     4     5     6     7     8     9    10
11    12

  Columns 14 through 26

    13    14    15    16    17    18    19    20    21    22    23
24    25

  Columns 27 through 39

    26    27    28    29    30    31    32    33    34    35    36
37    38

  Columns 40 through 52

    39    40    41    42    43    44    45    46    47    48    49
50    51

  Columns 53 through 65

    52    53    54    55    56    57    58    59    60    61    62
63    64

  Columns 66 through 78

    65    66    67    68    69    70    71    72    73    74    75
76    77

  Columns 79 through 91

    78    79    80    81    82    83    84    85    86    87    88
89    90

  Columns 92 through 101

    91    92    93    94    95    96    97    98    99   100


y =

  Columns 1 through 7
```

```
         0    0.0100    0.0200    0.0300    0.0400    0.0500    0.0600

Columns 8 through 14

    0.0700    0.0800    0.0900    0.1000    0.1100    0.1200    0.1300

Columns 15 through 21

    0.1400    0.1500    0.1600    0.1700    0.1800    0.1900    0.2000

Columns 22 through 28

    0.2100    0.2200    0.2300    0.2400    0.2500    0.2600    0.2700

Columns 29 through 35

    0.2800    0.2900    0.3000    0.3100    0.3200    0.3300    0.3400

Columns 36 through 42

    0.3500    0.3600    0.3700    0.3800    0.3900    0.4000    0.4100

Columns 43 through 49

    0.4200    0.4300    0.4400    0.4500    0.4600    0.4700    0.4800

Columns 50 through 56

    0.4900    0.5000    0.5100    0.5200    0.5300    0.5400    0.5500

Columns 57 through 63

    0.5600    0.5700    0.5800    0.5900    0.6000    0.6100    0.6200

Columns 64 through 70

    0.6300    0.6400    0.6500    0.6600    0.6700    0.6800    0.6900

Columns 71 through 77

    0.7000    0.7100    0.7200    0.7300    0.7400    0.7500    0.7600

Columns 78 through 84

    0.7700    0.7800    0.7900    0.8000    0.8100    0.8200    0.8300

Columns 85 through 91

    0.8400    0.8500    0.8600    0.8700    0.8800    0.8900    0.9000

Columns 92 through 98

    0.9100    0.9200    0.9300    0.9400    0.9500    0.9600    0.9700
```

```
  Columns 99 through 101

    0.9800    0.9900    1.0000

xy =

  Columns 1 through 7

         0    0.0100    0.0400    0.0900    0.1600    0.2500    0.3600

  Columns 8 through 14

    0.4900    0.6400    0.8100    1.0000    1.2100    1.4400    1.6900

  Columns 15 through 21

    1.9600    2.2500    2.5600    2.8900    3.2400    3.6100    4.0000

  Columns 22 through 28

    4.4100    4.8400    5.2900    5.7600    6.2500    6.7600    7.2900

  Columns 29 through 35

    7.8400    8.4100    9.0000    9.6100   10.2400   10.8900   11.5600

  Columns 36 through 42

   12.2500   12.9600   13.6900   14.4400   15.2100   16.0000   16.8100

  Columns 43 through 49

   17.6400   18.4900   19.3600   20.2500   21.1600   22.0900   23.0400

  Columns 50 through 56

   24.0100   25.0000   26.0100   27.0400   28.0900   29.1600   30.2500

  Columns 57 through 63

   31.3600   32.4900   33.6400   34.8100   36.0000   37.2100   38.4400

  Columns 64 through 70

   39.6900   40.9600   42.2500   43.5600   44.8900   46.2400   47.6100

  Columns 71 through 77

   49.0000   50.4100   51.8400   53.2900   54.7600   56.2500   57.7600

  Columns 78 through 84
```

```
   59.2900   60.8400   62.4100   64.0000   65.6100   67.2400   68.8900

  Columns 85 through 91

   70.5600   72.2500   73.9600   75.6900   77.4400   79.2100   81.0000

  Columns 92 through 98

   82.8100   84.6400   86.4900   88.3600   90.2500   92.1600   94.0900

  Columns 99 through 101

   96.0400   98.0100  100.0000


s =

        5050
```

Problem 3

```
A = [12 3 -6;2 8 11; 2 1 1], B = [1 2 3;4 5 6];

%3.1
sa = size(A)
sb = size(B)

%3.2
C = transpose(B)

%3.3
D = [A C]

%3.4
row2 = A(2,:)

%3.5
col1 = A(:,1)
col3 = A(:,3)

%3.6
row3 = A(3,:)
r23 = [row2; row3]

%3.7
aia = times(A,inv(A))

%3.8
A2 = A^2
% A.^2 (A.*A) = element by element dot product
% A^2 (A*A) = regular matrix multiplication
```

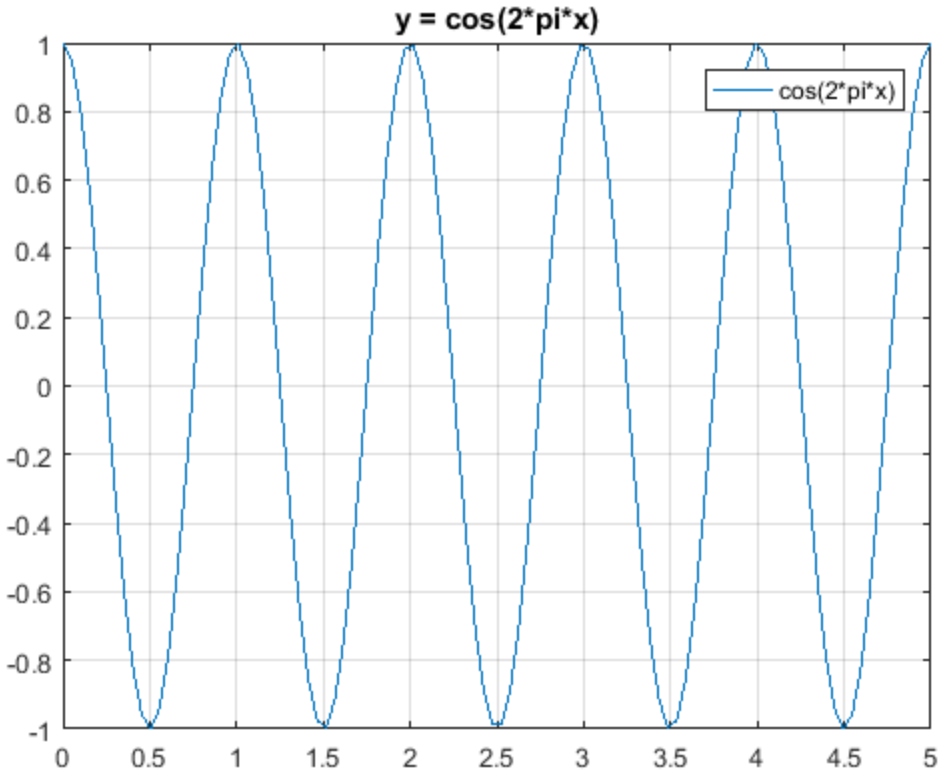
```
A =

    12     3    -6
     2     8    11
     2     1     1


sa =

     3     3


sb =

     2     3


C =

     1     4
     2     5
     3     6


D =

    12     3    -6     1     4
     2     8    11     2     5
     2     1     1     3     6


row2 =

     2     8    11


col1 =

    12
     2
     2


col3 =

    -6
    11
     1


row3 =

     2     1     1
```

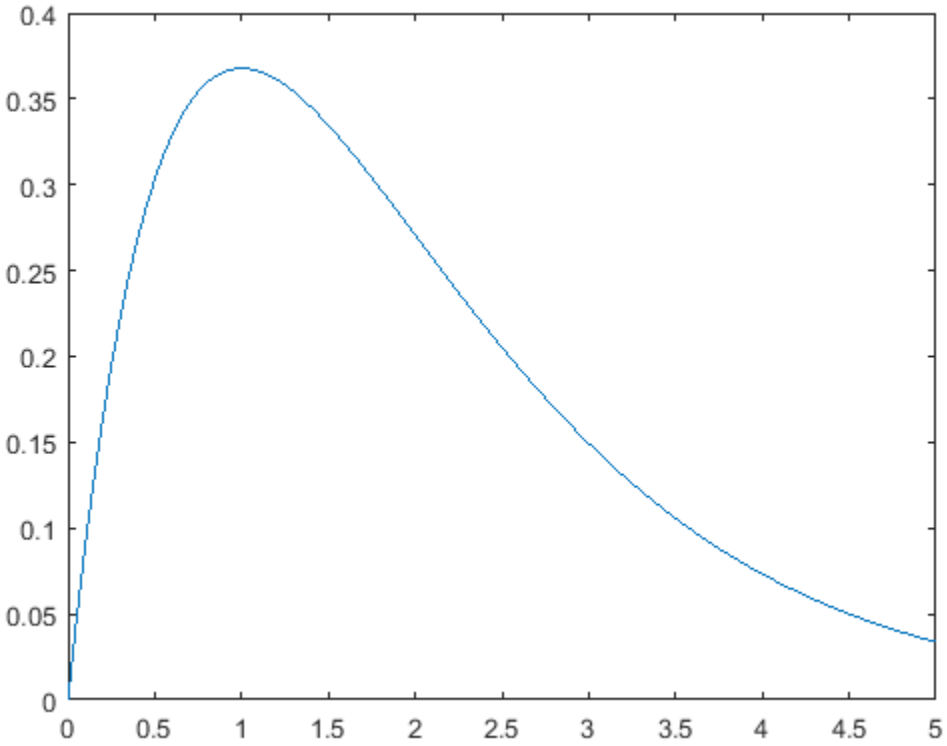
```
r23 =

     2     8    11
     2     1     1


aia =

   -0.3333   -0.2500   -4.5000
    0.3704    1.7778  -14.6667
   -0.2593   -0.0556    0.8333


A2 =

   138    54   -45
    62    81    87
    28    15     0
```

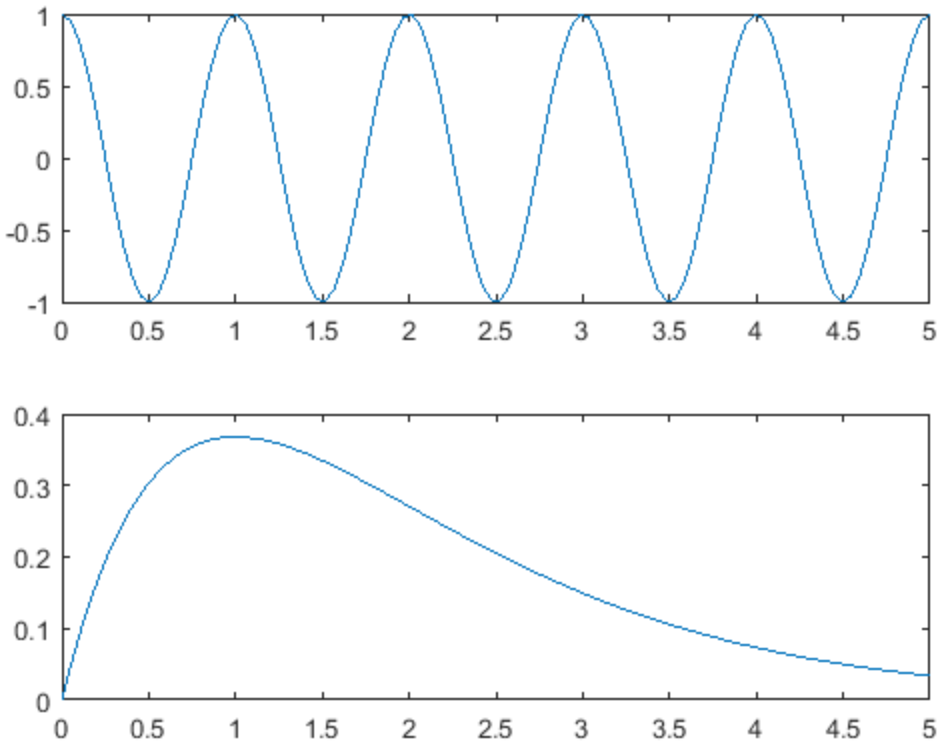
Problem 4

linspace(initial_val, final_val, # steps)

```
x = linspace(0,5,100);
y = cos(2*pi.*x);
figure
plot(x,y)

%4.1
title('y = cos(2*pi*x)')
legend('cos(2*pi*x)')
grid on

%4.2
hold on
g = x.*exp(-x);
figure
plot(x,g)
hold off

%4.3
figure
subplot(2,1,1)
plot(x,y)
subplot(2,1,2)
plot(x,g)
```


y = cos(2*pi*x)
cos(2*pi*x)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5


0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5



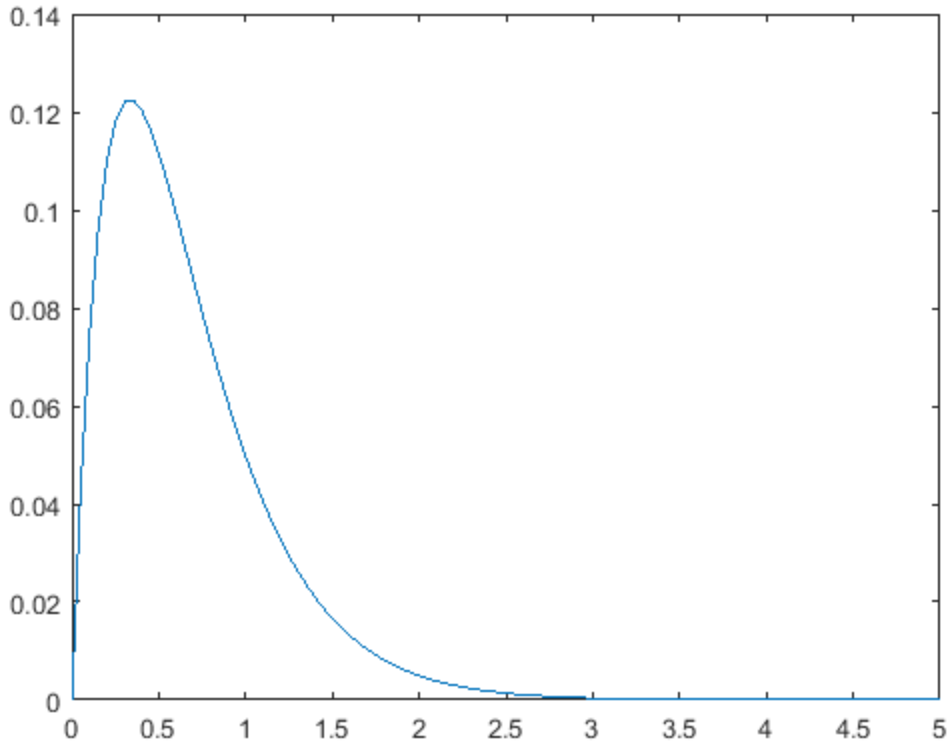
problem 5

Created seperate m-file titled sumsq.m

problem 6

Created seperate m-file titled graphfunc.m

```
b = 3;
y = graphfunc(b);
```



problem 7

```
syms t
y = cos(t);
d1 = diff(y,t,1)
d2 = diff(y,t,2)

t1 = 0;
t2 = pi;
d01 = subs(d1,t,t1)
d02 = subs(d2,t,t1)
dpi1 = subs(d1,t,t2)
dpi2 = subs(d2,t,t2)
```

```
d1 =

-sin(t)


d2 =

-cos(t)


d01 =
```

```
0
```

```
d02 =

-1
```

```
dpi1 =

0
```

```
dpi2 =

1
```

problem 8

```
syms t
y1 = t^3;
y2 = exp(-t.^2);
int1 = int(y1,t,-1,1)
int2 = int(y2,t, -inf, inf)
```

```
int1 =

0
```

```
int2 =

pi^(1/2)
```

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