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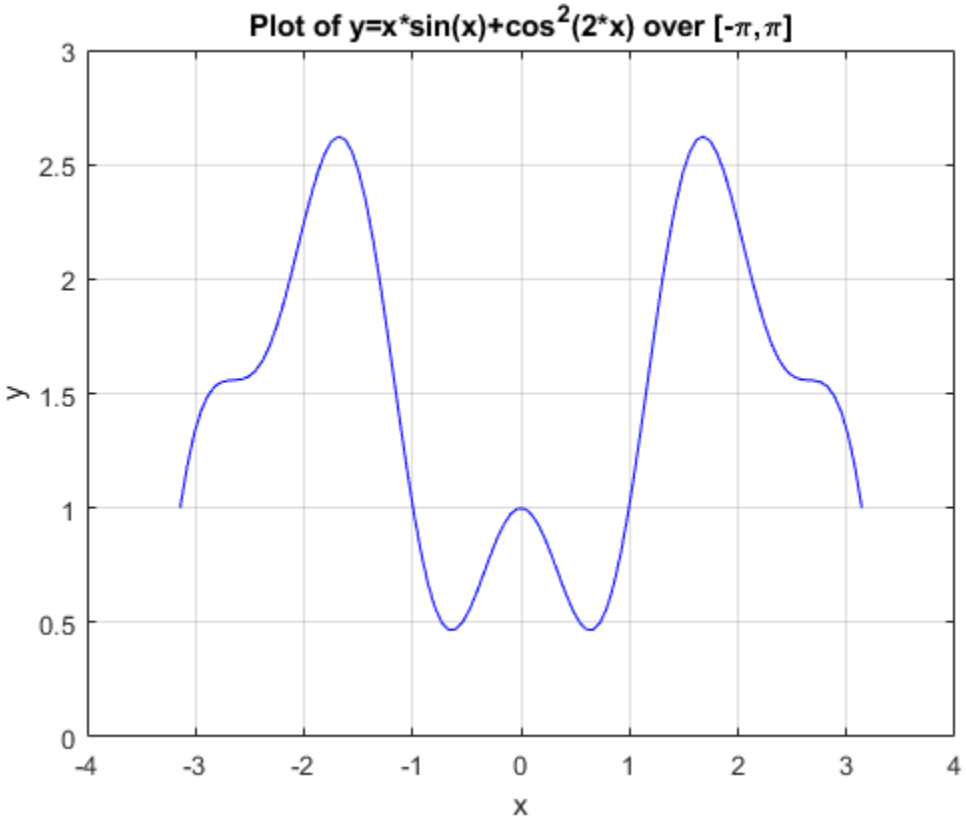
Problem 1

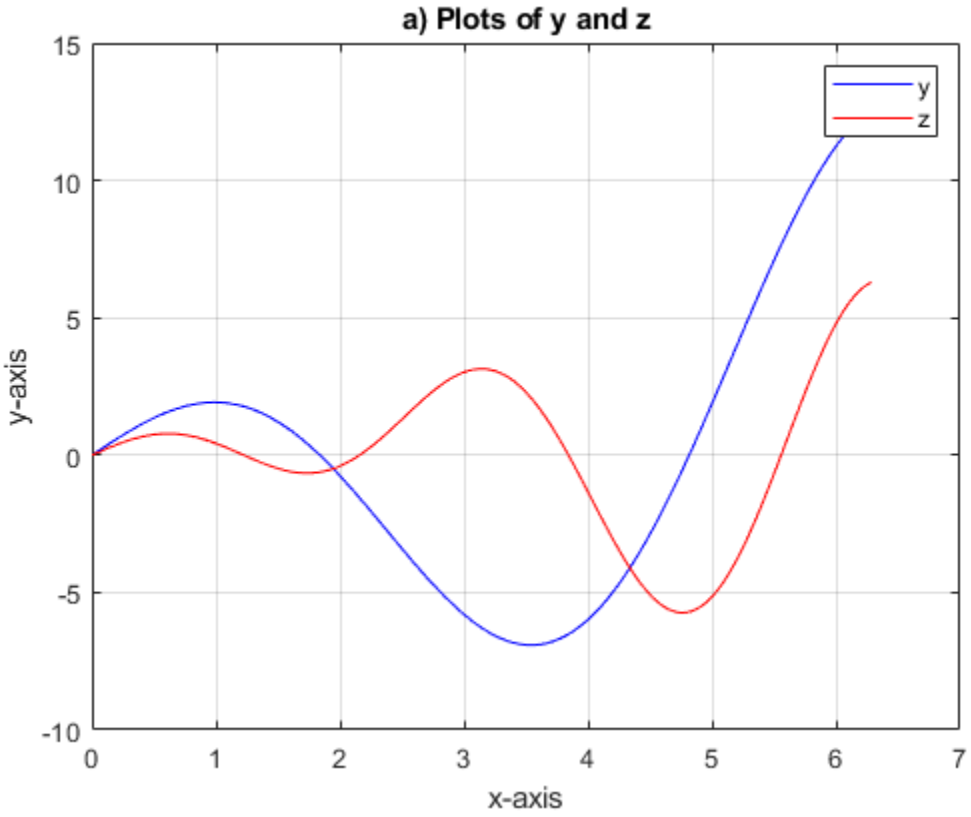
```
figure(1)
x=linspace(-pi,pi,100);
y=x.*sin(x)+cos(2*x).^2;
plot(x,y,'b-')
xlabel('x')
ylabel('y')
title('Plot of y=x*sin(x)+cos^2(2*x) over [-\pi,\pi]')
grid on
```

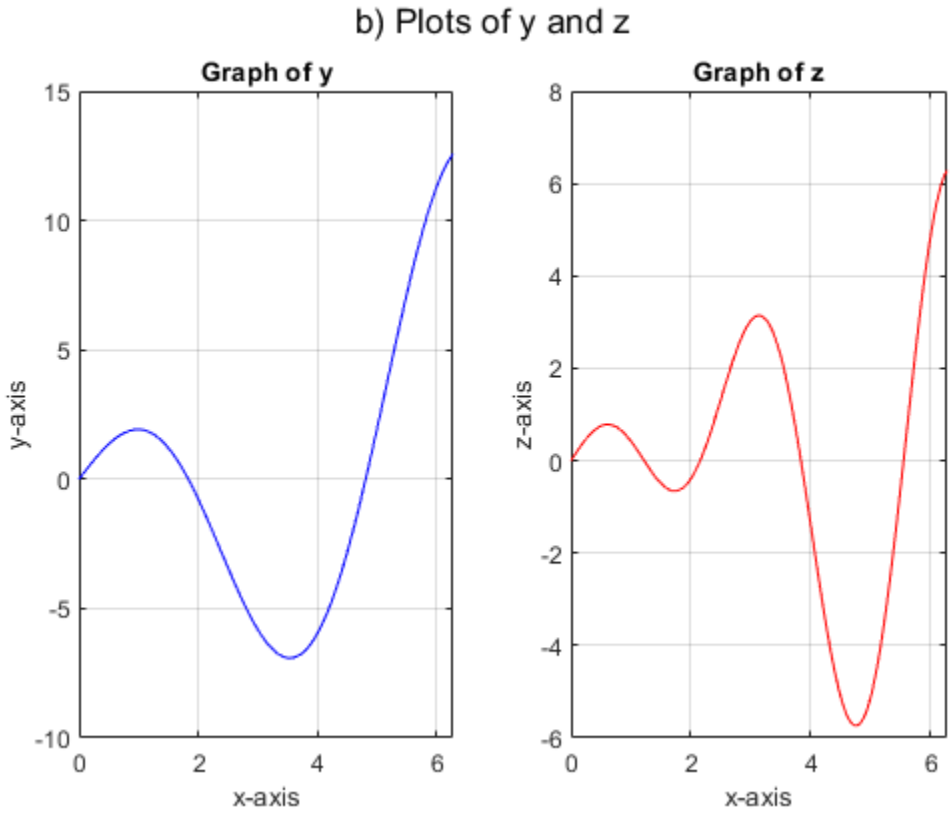


Problem 2

```
figure(2)
x=linspace(0,2*pi,201);
y=2*x.*cos(x)+sin(x);
z=sin(x)+x.*cos(2*x);
plot(x,y,'b-',x,z,'r-')
xlabel('x-axis')
ylabel('y-axis')
title('a) Plots of y and z')
legend('y','z')
grid on
figure(3)
subplot(1,2,1)
plot(x,y,'b-')
title('Graph of y')
xlabel('x-axis')
ylabel('y-axis')
grid on
subplot(1,2,2)
plot(x,z,'r-')
title('Graph of z')
xlabel('x-axis')
ylabel('z-axis')
```

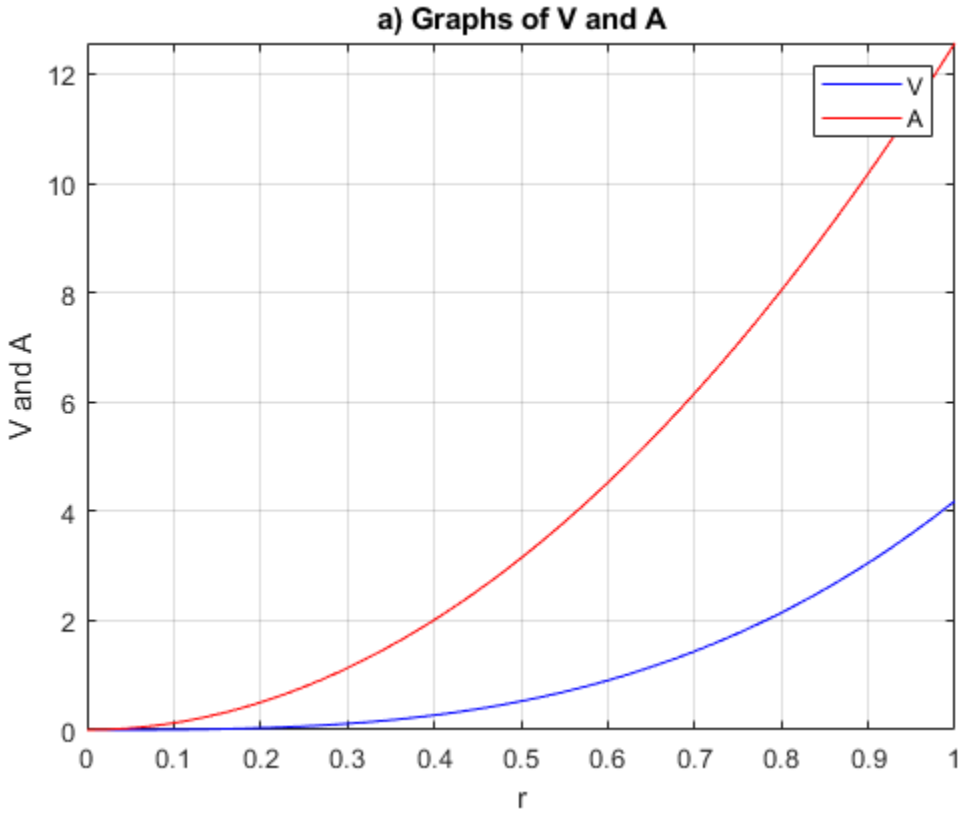
```
grid on
sgtitle('b) Plots of y and z')
```

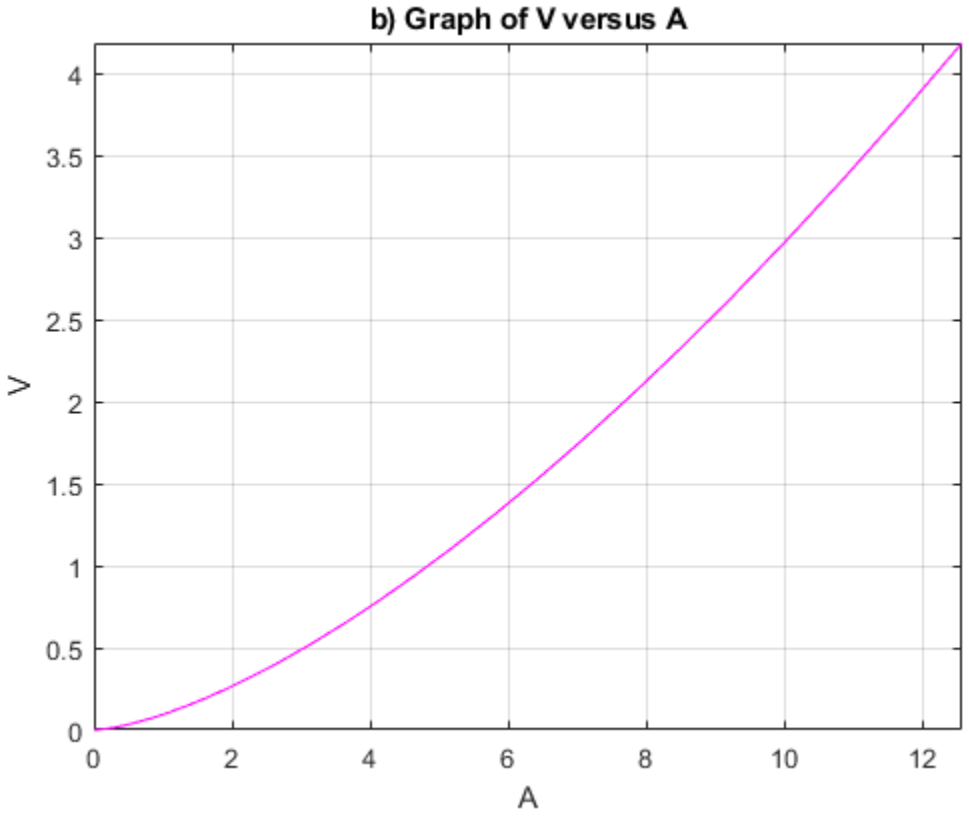




Problem 3

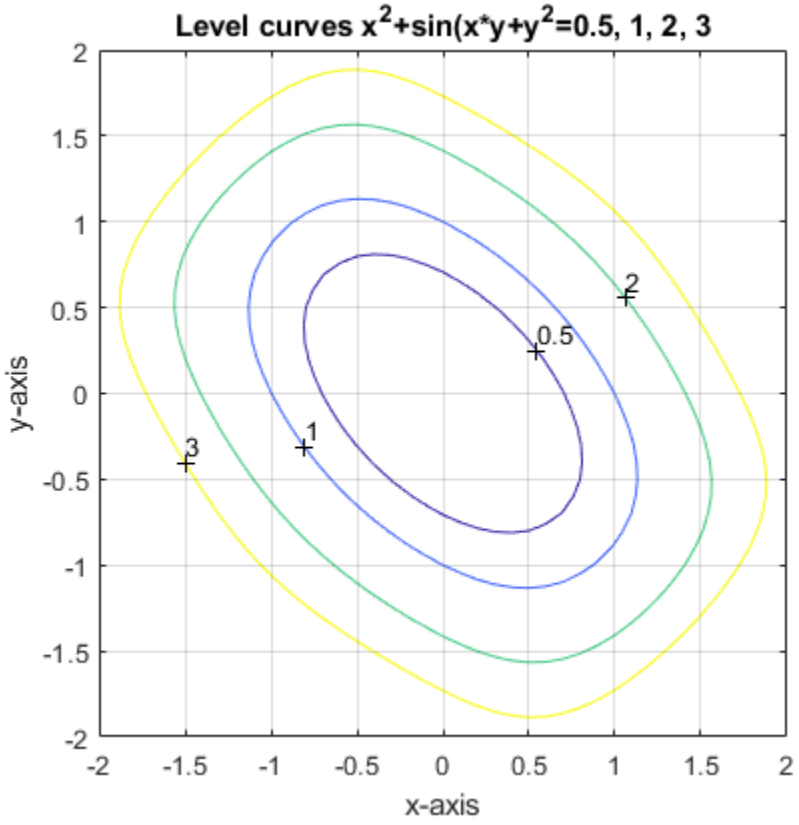
```
figure(4)
fplot(@(r)(4*pi*r.^3)/3,[0 1],'b-')
hold on
fplot(@(r)4*pi*r.^2,[0 1],'r-')
hold off
grid on
xlabel('r')
ylabel('V and A')
title('a) Graphs of V and A')
legend('V','A')
figure(5)
fplot(@(r)4*pi*r.^2,@(r)(4*pi*r.^3)/3,[0 1],'m-')
grid on
xlabel('A')
ylabel('V')
title('b) Graph of V versus A')
```


a) Graphs of V and A
V
A
V and A
r
0
2
4
6
8
10
12
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1


b) Graph of V versus A
V
A
0
0.5
1
1.5
2
2.5
3
3.5
4
2
4
6
8
10
12

Problem 4

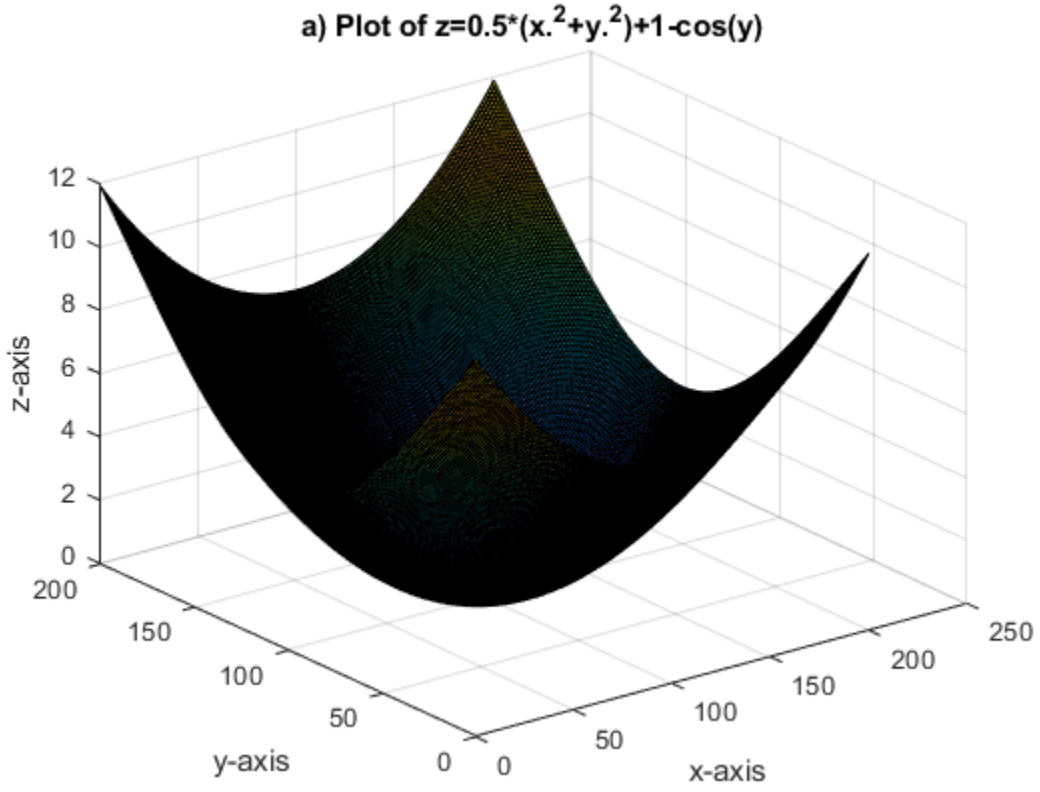
```
figure(6)
[x,y]=meshgrid(-2:0.1:2,-2:0.1:2);
z=x.^2+sin(x.*y)+y.^2;
cs=contour(x,y,z,[0.5,1 2 3]);
clabel(cs)
title('Level curves x^2+sin(x*y+y^2=0.5, 1, 2, 3')
grid on
xlabel('x-axis')
ylabel('y-axis')
axis equal
```

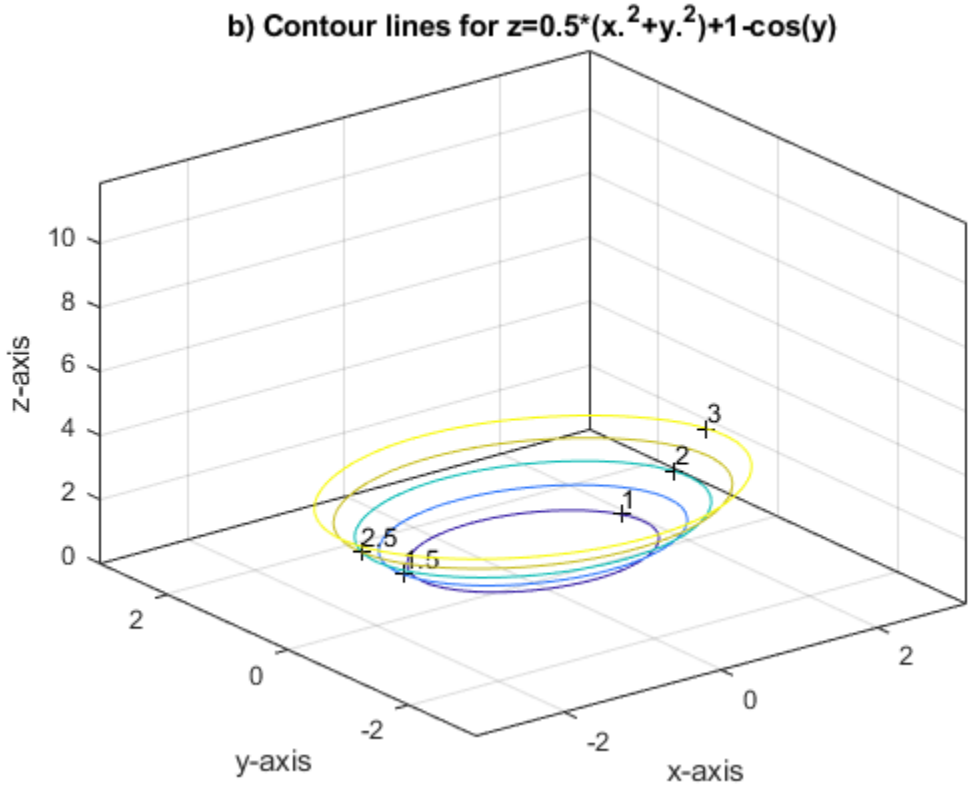


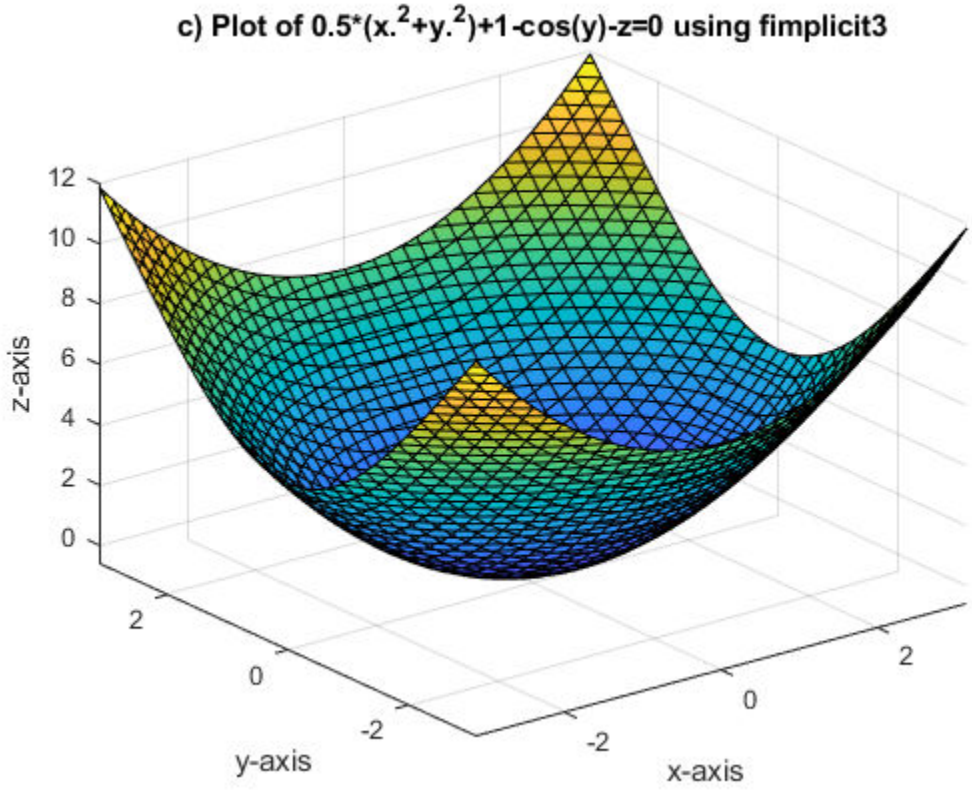
Problem 5

```
figure(7)
[x,y]=meshgrid(linspace(-pi,pi,201), linspace(-pi,pi,201));
z=0.5*(x.^2+y.^2)+1-cos(y);
surf(z)
title('a) Plot of z=0.5*(x.^2+y.^2)+1-cos(y)')
xlabel('x-axis')
ylabel('y-axis')
zlabel('z-axis')
figure(8)
cs3=contour3(x,y,z,[1 1.5 2 2.5 3]);
```

```
clabel(cs3)
title('b) Contour lines for z=0.5*(x.^2+y.^2)+1-cos(y)')
xlabel('x-axis')
ylabel('y-axis')
zlabel('z-axis')
figure(9)
fimplicit3(@(x,y,z)0.5*(x.^2+y.^2)+1-cos(y)-z,[-pi pi -pi pi -12 12])
title('c) Plot of 0.5*(x.^2+y.^2)+1-cos(y)-z=0 using fimplicit3')
xlabel('x-axis')
ylabel('y-axis')
zlabel('z-axis')
```




b) Contour lines for z=0.5*(x.^2+y.^2)+1-cos(y)
z-axis
10
8
6
4
2
0
2
0
-2
y-axis
2
0
-2
x-axis
3
2
1
2.5
1.5


c) Plot of 0.5*(x.^2+y.^2)+1-cos(y)-z=0 using fimplicit3
z-axis
12
10
8
6
4
2
0
2
0
-2
y-axis
2
0
-2
x-axis

Problem 6

```
type Leonardo
n=12;
fprintf('For example, the first %.0f Fibonacci numbers are:\n',n)
disp(Leonardo(n))


function F=Leonardo(n)
F(1)=1;
F(2)=2;
for i=3:n
    F(i)=F(i-1)+F(i-2);
end
end

For example, the first 12 Fibonacci numbers are:
     1     2     3     5     8    13    21    34    55    89   144   233
```

Problem 7

```
type altsum
n=15;
S=altsum(n);
fprintf('For n=%d the alternating sum is S=%f\n',n,S)


function s = altsum(n)
% This function calculates s=1^2/2^1-2^3/3^2+...+(-1)^(n+1)*n^(n+1)/(n+1)^n
s=0;
for i=1:n
    s=s+(-1)^(i+1)*i^(i+1)/(i+1)^i;
end
end
For n=15 the alternating sum is S=3.091077
```

Problem 8

```
M=10000;
n=0;
while M<10^6
    n=n+1;
    M=(1+0.12/4)^4*M+6000;
end
fprintf('Time %.f years\n',n)
fprintf('Money $%.f\n',M)

Time 25 years
Money $1063135
```

Problem 9

```
type nofdays
days=nofdays('January')


function days = nofdays(M)
% This function provides the number of days of the month M.
n='January';
if strcmp(n,'January')==1||strcmp(n,'March')==1||strcmp(n,'May')==1||...
   strcmp(n,'July')==1||strcmp(n,'August')==1||strcmp(n,'October')==1||
strcmp(n,'December')==1
    days=31;
elseif strcmp(n,'February')==1
    days=28;
elseif strcmp(n,'April')==1||strcmp(n,'June')==1||strcmp(n,'September')==1||
strcmp(n,'November')==1
    days=30;
else
    disp('Typo')
end
end

days =

    31
```

Problem 10

```
format bank
type Money
Daily=Money(40,10000,0.12,'daily')
Weekly=Money(40,10000,0.12,'weekly')
Monthly=Money(40,10000,0.12,'monthly')
Quarterly=Money(40,10000,0.12,'quarterly')
Semiannually=Money(40,10000,0.12,'semiannually')
Annually=Money(40,10000,0.12,'annually')


function M = Money(n,M0,r,freq)
%This MATLAB function compute the amount of money that accumulates in a
%savings account in n years, starting from M0, and
%with annual interest rate r and componding frequency freq.
switch freq
    case 'daily'
        M=M0*(1+r/365)^(n*365);
    case 'weekly'
        M=M0*(1+r/52)^(n*52);
    case 'monthly'
        M=M0*(1+r/12)^(n*12);
    case 'quarterly'
        M=M0*(1+r/4)^(n*4);
```

```
    case 'semiannually'
        M=M0*(1+r/2)^(n*2);
    case 'annually'
        M=M0*(1+r)^(n);
    otherwise
        M='Misppeling or unfamiliar frequency';
end
end
```

```
Daily =

    1214146.00


Weekly =

    1208403.25


Monthly =

    1186477.25


Quarterly =

    1132285.52


Semiannually =

    1057959.93


Annually =

     930509.70
```

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