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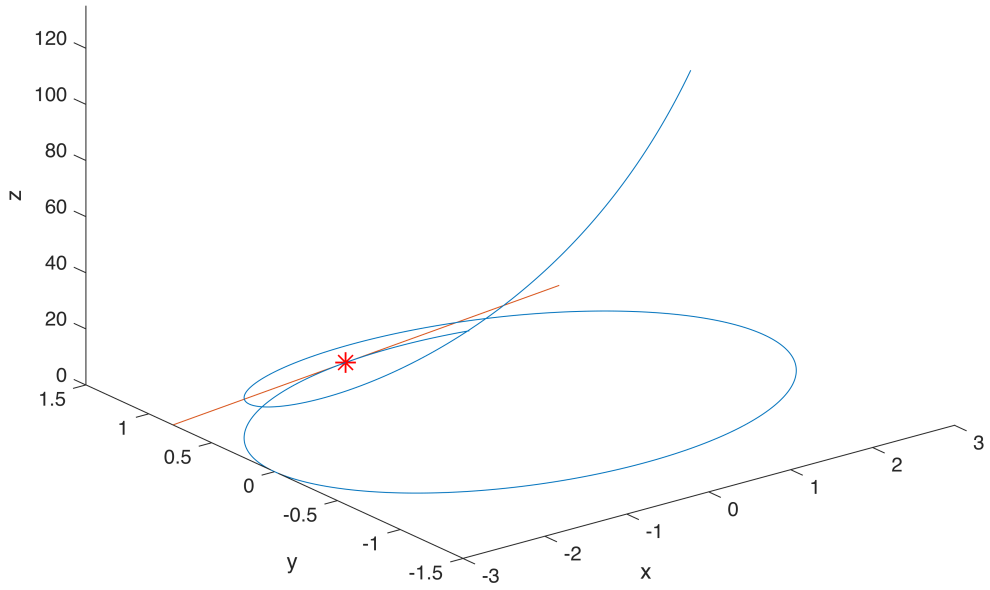
02/15/2024

HW 3

1.

a.

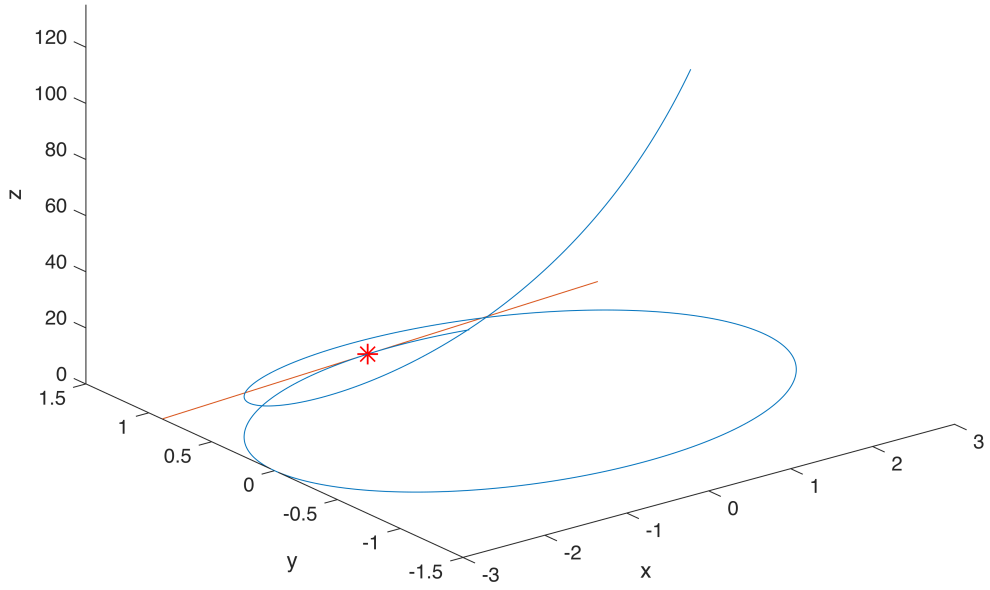
```
t=linspace(-5, 5,1000);
x=3*cos(t);
y=sin(t);
z=exp(t);
plot3(x,y,z),hold on
xlabel('x')
ylabel('y')
zlabel('z')
t0=-4.5;
x0=3*cos(t0);
y0=sin(t0);
z0=exp(t0);
a=-3*sin(t0);
b=cos(t0);
c=exp(t0);
t=linspace(t0-1,t0+1);
x = x0 + a*(t-t0);
y = y0 + b*(t-t0);
z = z0 + c*(t-t0);
plot3(x,y,z)
plot3(x0, y0, z0, 'r*', 'MarkerSize', 10, 'LineWidth', 1.5)
xlim([-3,3])
ylim([-1.5,1.5])
zlim([0,135])
hold off
```



b.

```
t=linspace(-5, 5,1000);
x=3*cos(t);
y=sin(t);
z=exp(t);
plot3(x,y,z),hold on
xlabel('x')
ylabel('y')
zlabel('z')
t0=-4.6;
x0=3*cos(t0);
y0=sin(t0);
z0=exp(t0);
a=-3*sin(t0);
b=cos(t0);
c=exp(t0);
t=linspace(t0-1,t0+1);
x = x0 + a*(t-t0);
y = y0 + b*(t-t0);
z = z0 + c*(t-t0);
plot3(x,y,z)
plot3(x0, y0, z0, 'r*', 'MarkerSize', 10, 'LineWidth', 1.5);
xlim([-3,3])
ylim([-1.5,1.5])
zlim([0,135])
```

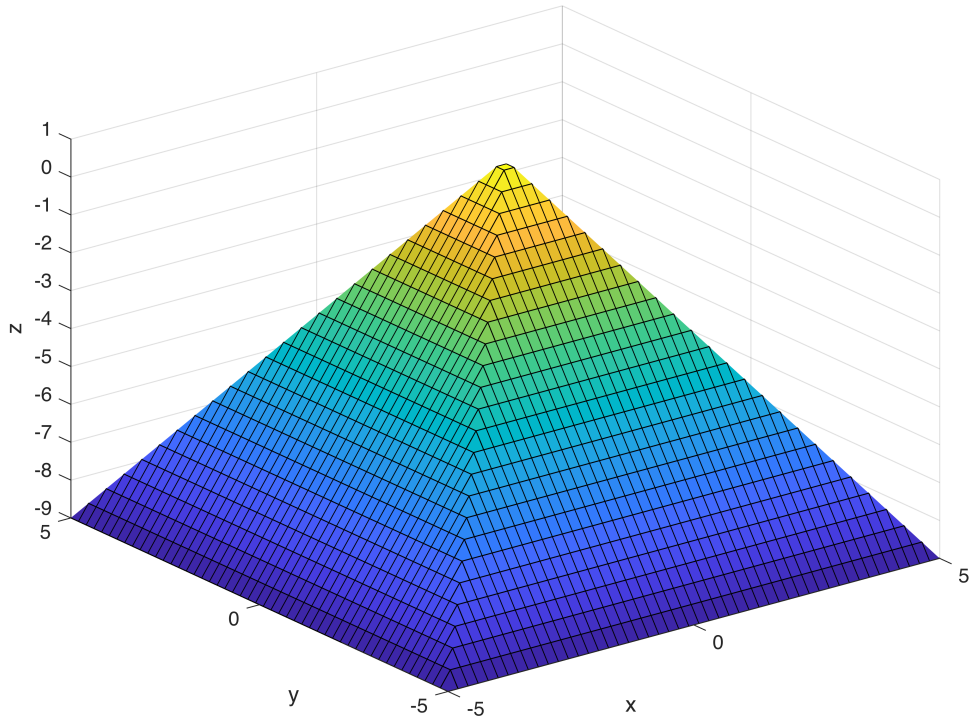
```
hold off
```



2.

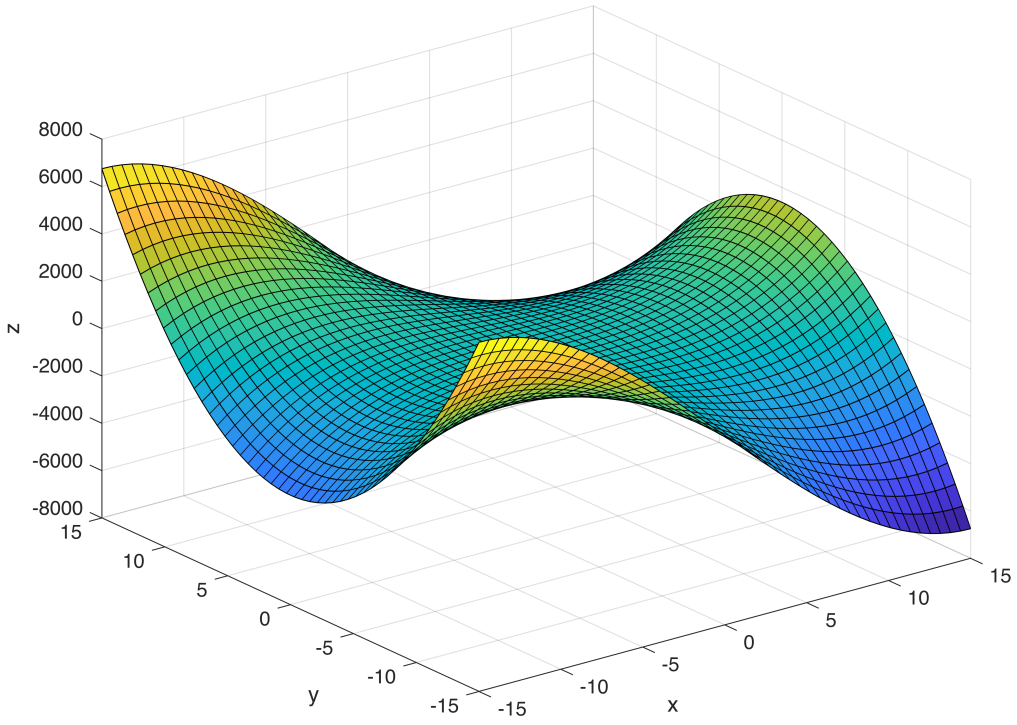
a.

```
[X,Y] = meshgrid(linspace(-5,5,50));
Z = 1-abs(X+Y)-abs(Y-X);
surf(X,Y,Z)
xlabel('x')
ylabel('y')
zlabel('z')
```



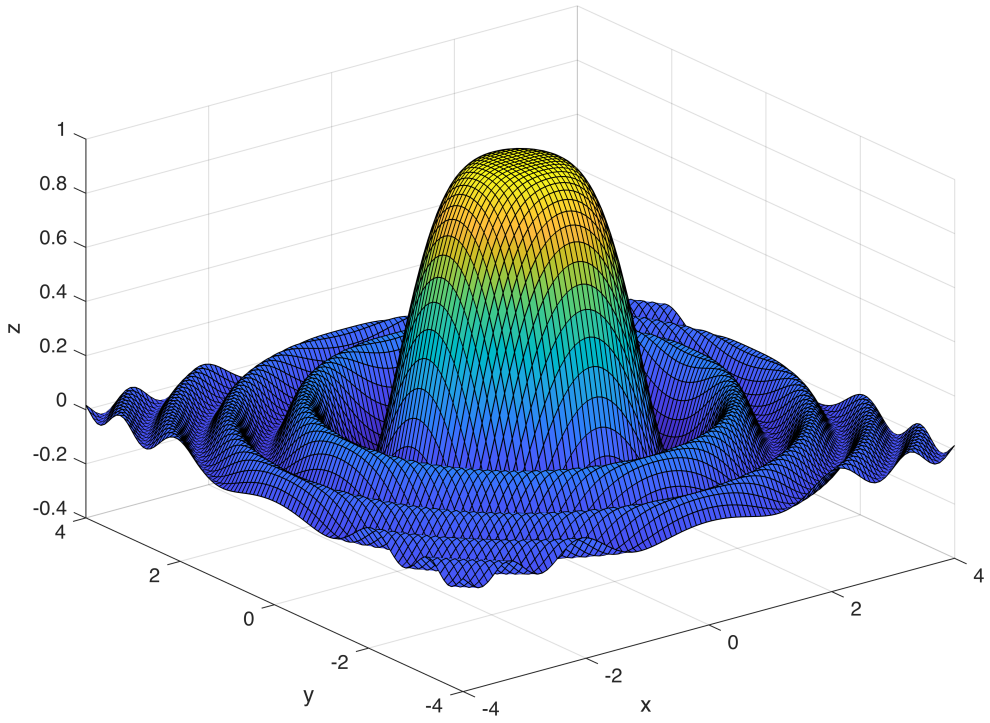
b.

```
[X,Y] = meshgrid(linspace(-15,15,50));
Z = X.^3-(3.*X.*Y.^2);
surf(X,Y,Z)
xlabel('x')
ylabel('y')
zlabel('z')
```



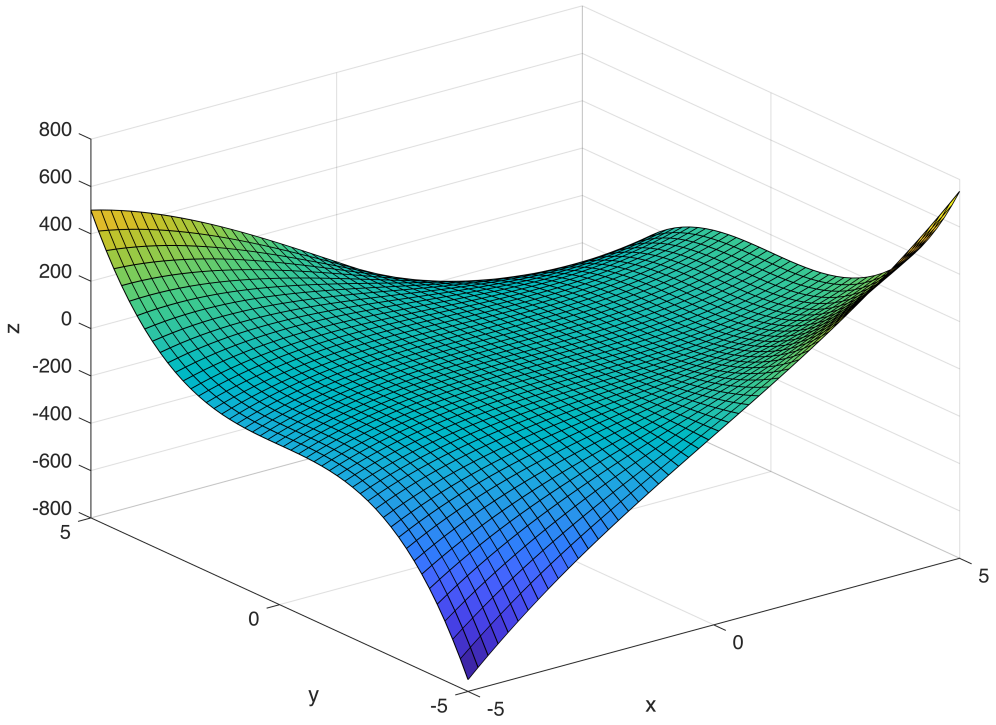
c.

```
[X,Y] = meshgrid(linspace(-4,4,100));
Z = (sin(X.^2+Y.^2)./(X.^2+Y.^2));
surf(X,Y,Z)
xlabel('x')
ylabel('y')
zlabel('z')
```



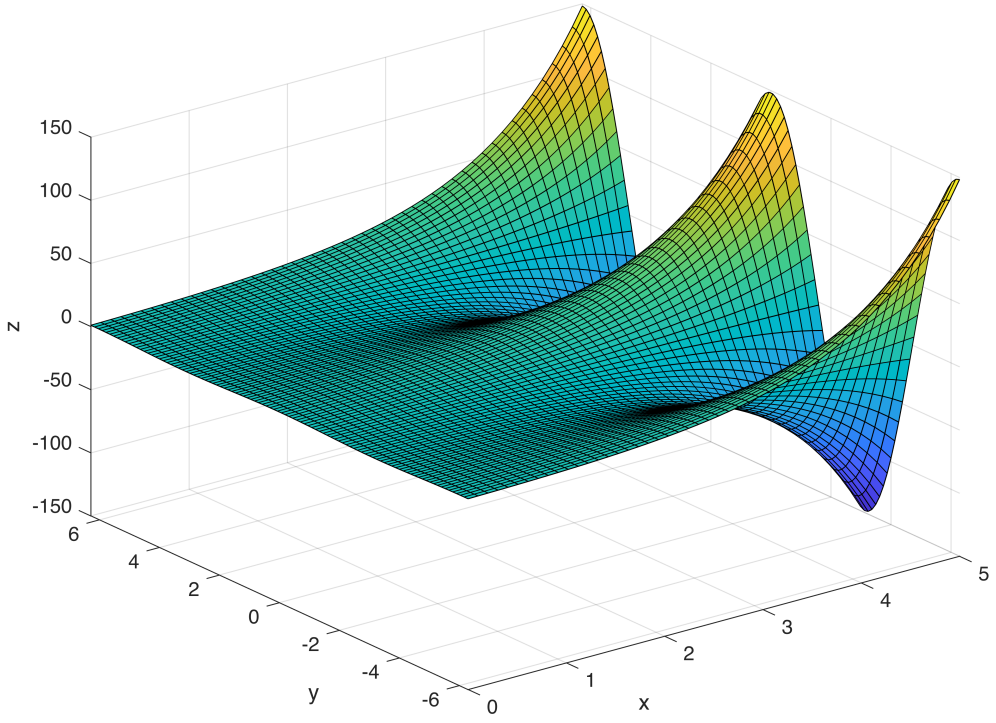
d.

```
[X,Y] = meshgrid(linspace(-5,5,50));
Z = X.^3-(X.*Y.^3);
surf(X,Y,Z)
xlabel('x')
ylabel('y')
zlabel('z')
```



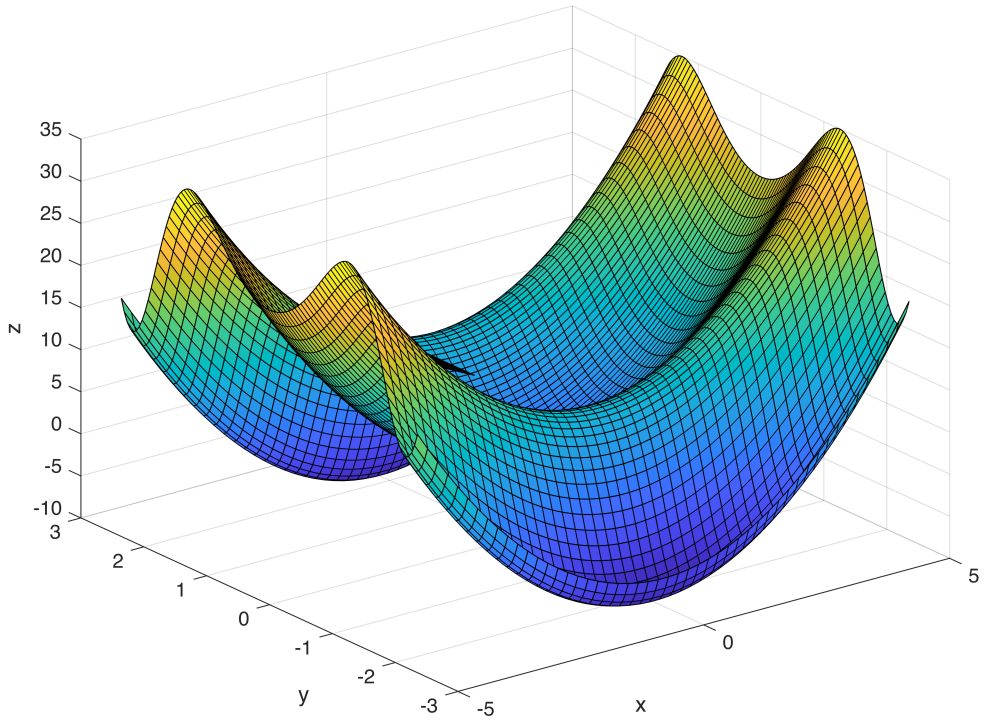
e.

```
[X,Y] = meshgrid(linspace(0,5,50),linspace(-2*pi,2*pi));
Z = exp(X).*cos(Y);
surf(X,Y,Z)
xlabel('x')
ylabel('y')
zlabel('z')
```



3.

```
[X,Y] = meshgrid(linspace(-5,5,50),linspace((-3*pi)/4,(3*pi)/4));
Z = X.^2+10*sin(Y.^2);
surf(X,Y,Z)
xlabel('x')
ylabel('y')
zlabel('z')
hold on
[X, Y] = meshgrid(linspace(-1.5-1,-1.5+1,50),linspace(sqrt(pi/2)-1,sqrt(pi/
2)+1));
plot3(-1.5,sqrt(pi/2),12.25, 'r*', 'MarkerSize', 13, 'LineWidth', 1.5);
Z = 12.25+-3*(X+1.5);
surf(X,Y,Z)
hold off
```

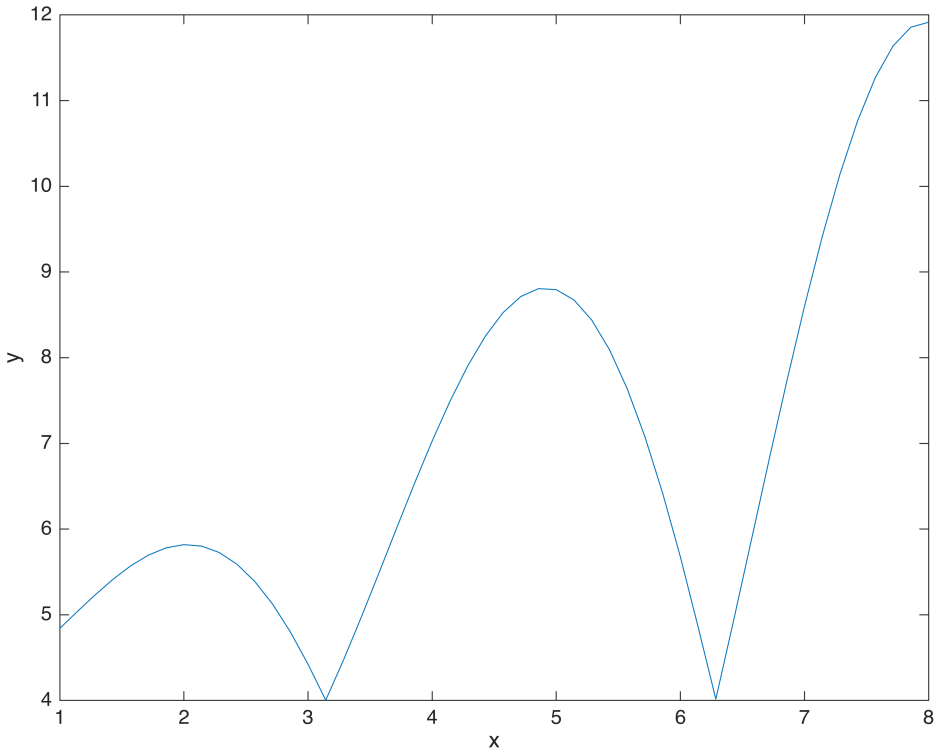


You can't see the plane nor the asterisk in the pdf file, but rotating the graph in the mlx file will show both

4.

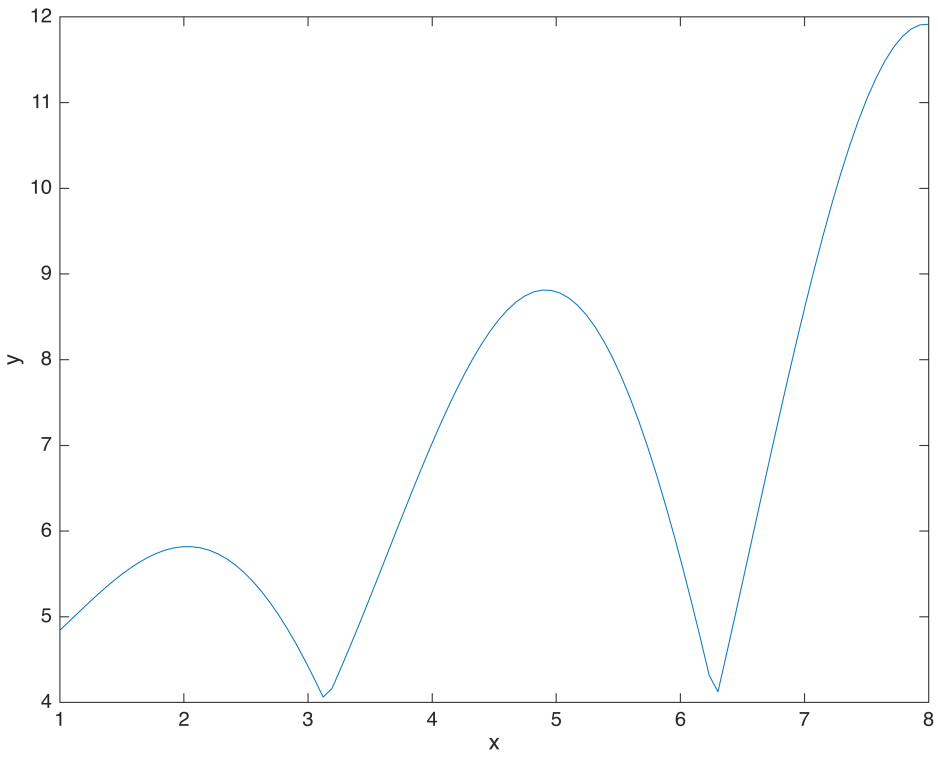
a.

```
x = linspace(1,8,50);
y = x.*abs(sin(x))+4;
plot(x,y)
xlabel('x')
ylabel('y')
```

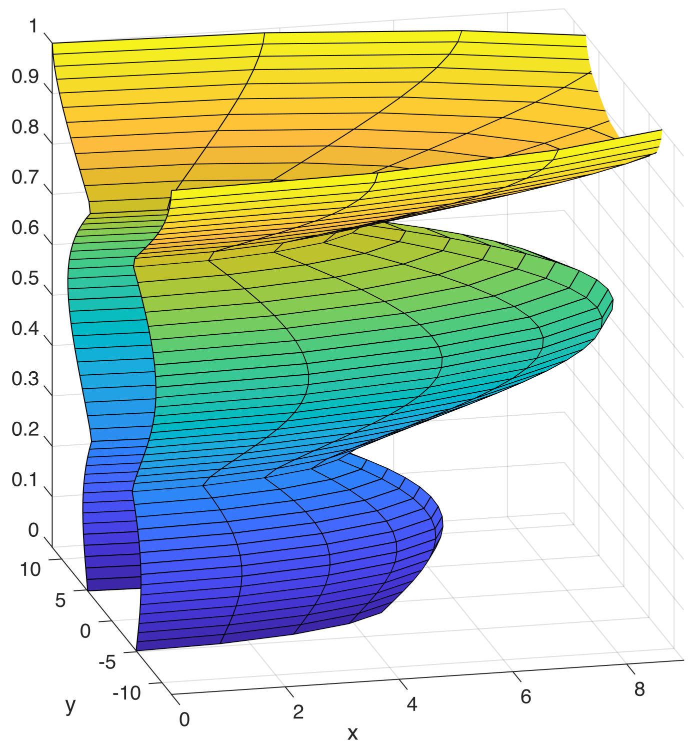


b.

```
x = linspace(1,8);
y = x.*abs(sin(x))+4;
plot(x,y)
xlabel('x')
ylabel('y')
```




```
r = y(1:2:end);
cylinder(r,20)
xlabel('x')
ylabel('y')
axis square
xlim([0,9])
view([-13.1 16.7])
```



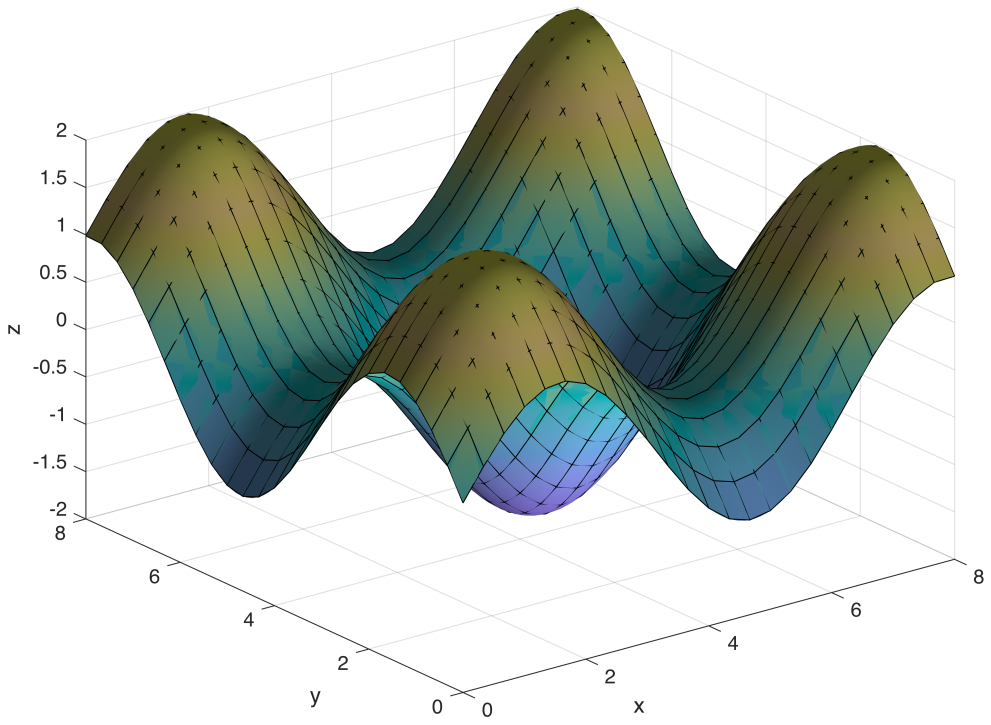
5.

```
fsurf(@(X,Y)sin(X)+sin(Y),[0, 8],'EdgeColor','none')
hold on
[X,Y]=meshgrid(linspace(0,8,25)),'FaceColor','none';
```

```
X = 25×25
         0    0.3333    0.6667    1.0000    1.3333    1.6667    2.0000    2.3333 ···
         0    0.3333    0.6667    1.0000    1.3333    1.6667    2.0000    2.3333
         0    0.3333    0.6667    1.0000    1.3333    1.6667    2.0000    2.3333
         0    0.3333    0.6667    1.0000    1.3333    1.6667    2.0000    2.3333
         0    0.3333    0.6667    1.0000    1.3333    1.6667    2.0000    2.3333
         0    0.3333    0.6667    1.0000    1.3333    1.6667    2.0000    2.3333
         0    0.3333    0.6667    1.0000    1.3333    1.6667    2.0000    2.3333
         0    0.3333    0.6667    1.0000    1.3333    1.6667    2.0000    2.3333
         0    0.3333    0.6667    1.0000    1.3333    1.6667    2.0000    2.3333
         0    0.3333    0.6667    1.0000    1.3333    1.6667    2.0000    2.3333
    ⋮
Y = 25×25
         0         0         0         0         0         0         0         0 ···
    0.3333    0.3333    0.3333    0.3333    0.3333    0.3333    0.3333    0.3333
    0.6667    0.6667    0.6667    0.6667    0.6667    0.6667    0.6667    0.6667
    1.0000    1.0000    1.0000    1.0000    1.0000    1.0000    1.0000    1.0000
    1.3333    1.3333    1.3333    1.3333    1.3333    1.3333    1.3333    1.3333
    1.6667    1.6667    1.6667    1.6667    1.6667    1.6667    1.6667    1.6667
    2.0000    2.0000    2.0000    2.0000    2.0000    2.0000    2.0000    2.0000
    2.3333    2.3333    2.3333    2.3333    2.3333    2.3333    2.3333    2.3333
    2.6667    2.6667    2.6667    2.6667    2.6667    2.6667    2.6667    2.6667
    3.0000    3.0000    3.0000    3.0000    3.0000    3.0000    3.0000    3.0000
```

```
    ⋮
ans =
'FaceColor'
```

```
Z = sin(X)+sin(Y);
surf(X,Y,Z)
%fmesh(@(X, Y)sin(X)+sin(Y),[0, 8],'FaceColor','none')
hold off
xlabel('x')
ylabel('y')
zlabel('z')
lightangle(0,-30)
lighting gouraud
brighten(.55)
```




```
clf
colormap default
```

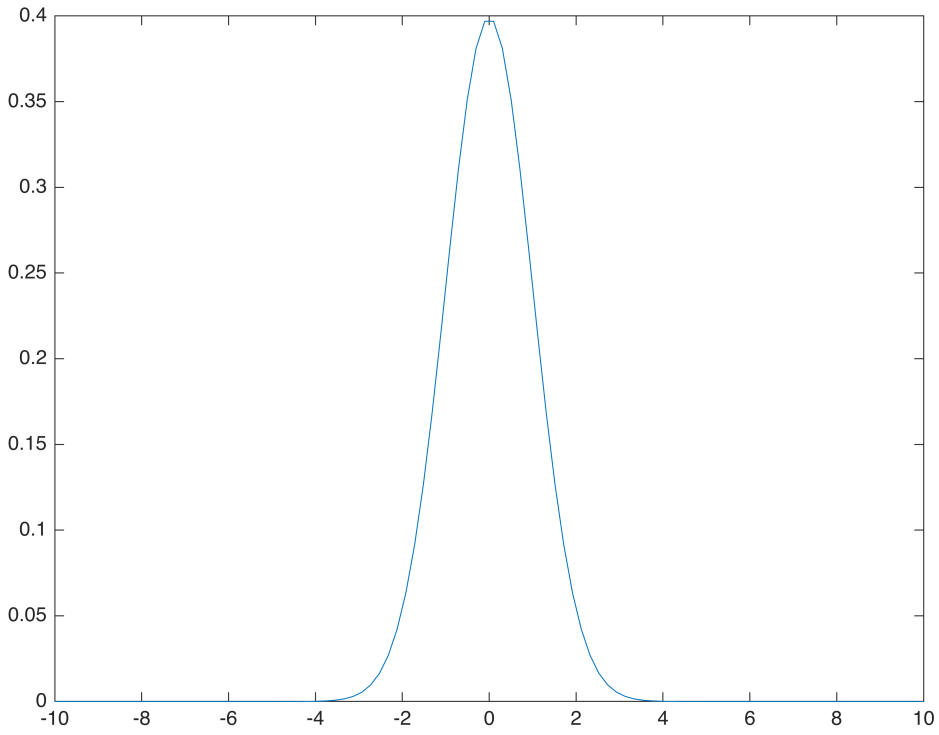
I think this is the best I can do, I couldn't figure out how to get the grid all the way connected or how to use fmesh. I've commented the lines where I tried to use it, but actually using it makes the graph look very weird.

6.

b.

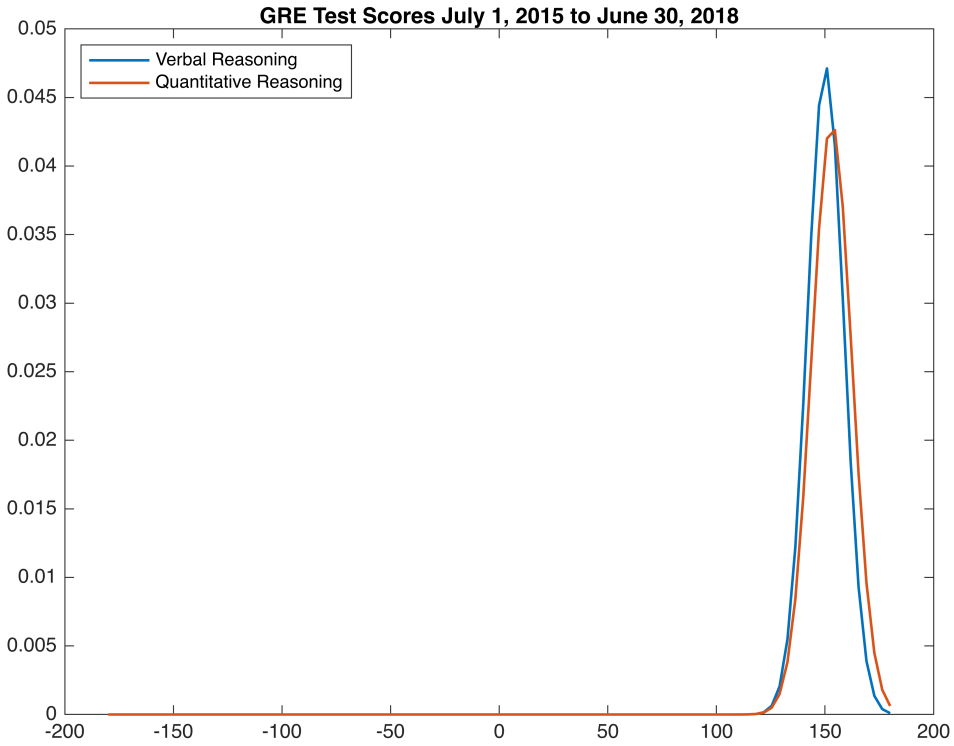
```
mu_value = 0;
```

```
sigma_value = 1;
part_b = npdf(x,0,1);
x = linspace(-10,10);
y = (1./(sqrt(2*pi))).*exp(-0.5.*(x.^2));
plot(x,y)
```



c.

```
x = linspace(-180,180);
y1 = (1./(8.44.*sqrt(2*pi))).*exp(-0.5.*((x-150.24)./(8.44)).^2);
y2 = (1./(9.24.*sqrt(2*pi))).*exp(-0.5.*((x-153.07)./(9.24)).^2);
plot(x,y1,'LineWidth',1.3)
hold on
plot(x,y2,'LineWidth',1.3)
hold off
title 'GRE Test Scores July 1, 2015 to June 30, 2018'
legend('Verbal Reasoning','Quantitative Reasoning','Location','northwest')
```



a.

```
function normal_dist = npdf(x,sigma,mu)
    normal_dist = (1./(sigma.*sqrt(2*pi))).*exp(-0.5.*((x-mu)./sigma).^2);
end
```