Q3(c)

Load data and scatter plot

```
clear
load points2D_Set2.mat
scatter(x,y)
hold on
```

Finding Mean and subtracting from data

```
mx = sum(x)/size(x,1);
my = sum(y)/size(y,1);
x = x-mx;
y = y-my;
```

Covariance matrix and eigen value decomposition

```
c = [x'*x , x'*y ; x'*y , y'*y] / size(x,1);
[V, d] = eig(c);
d = diag(d);
```

Getting the direction of maximum variance(as there are only two eigen values we can use a simple if statement instead of argmax)

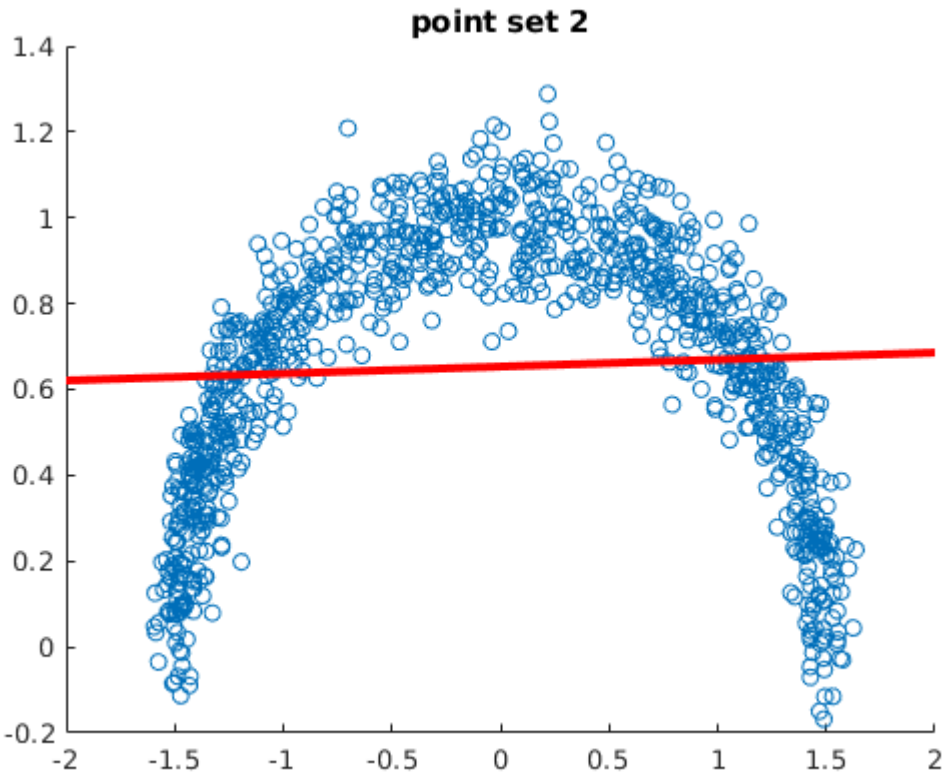
```
if d(1) > d(2)
    u =  V(:,1);
else
    u = V(:,2);
end
u
```

```
u = 2×1
   -0.9999
   -0.0162
```

Plotting the linear relationship

$$u_1\left(Y - m_Y\right) = u_2\left(X - m_X\right) \Rightarrow Y = \frac{u_2}{u_1}(X - m_X) + m_Y$$

```
line(xlim, my+u(2)*(xlim-mx)/u(1) ,'LineWidth',3,'Color','red' );
title("point set 2");
hold off
```



Normalised mean square error

```
error = sum((y - u(2)*x/u(1)).^2)/(size(x,1)*my*my)
```

```
error = 0.2292
```