

Q3(b)

Load data and scatter plot

```
clear
load points2D_Set1.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);
```

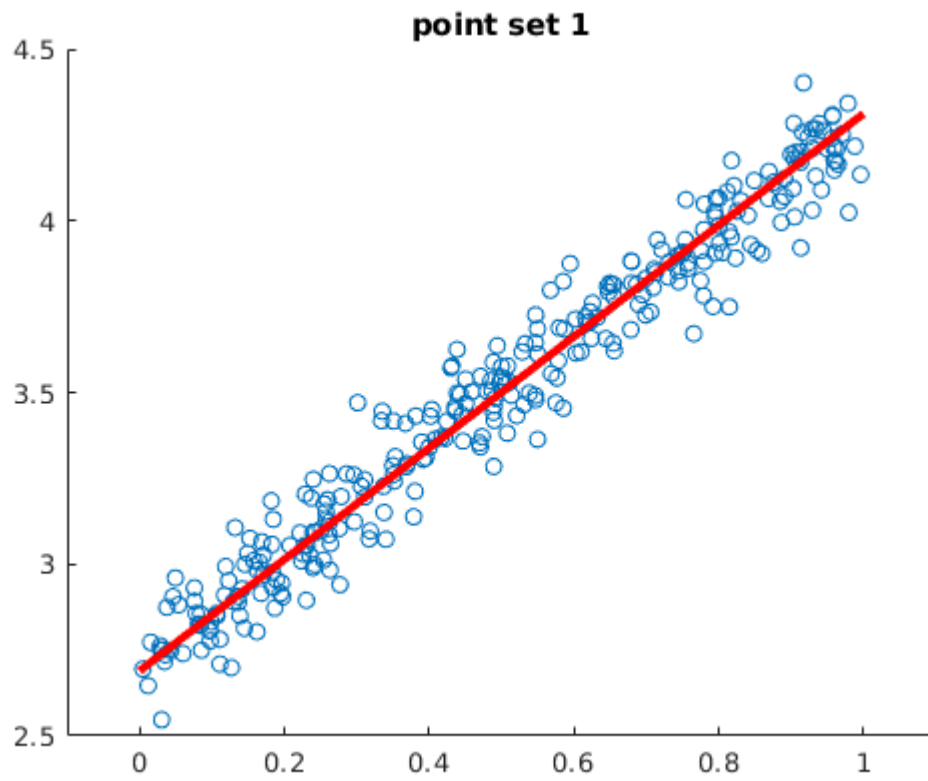
Getting the direction of maximum variance(as there are only two eigen values we can use a simple if statement instead of argmax)

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

Plotting the linear relationship

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

```
line(xlim, my+u(2)*(xlim-mx)/u(1) , 'LineWidth',3, 'Color','red' );
xlim([-0.1 1.1]);
title("point set 1");
hold off
```



Normalised mean square error

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

```
error = 7.4996e-04
```