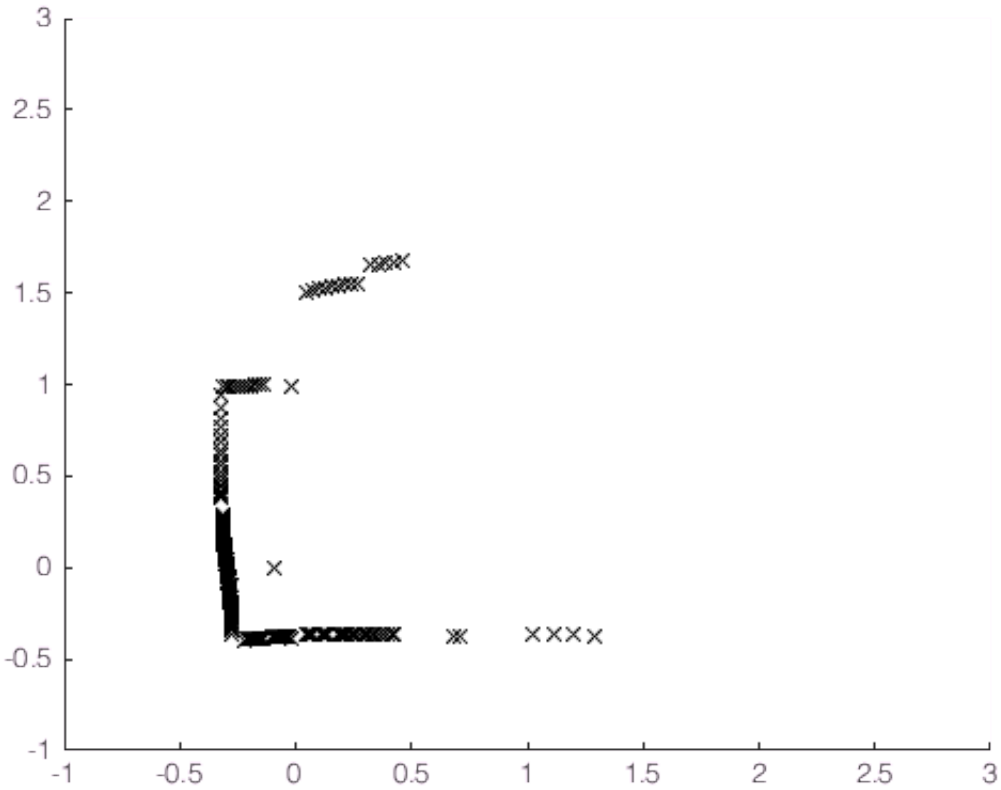
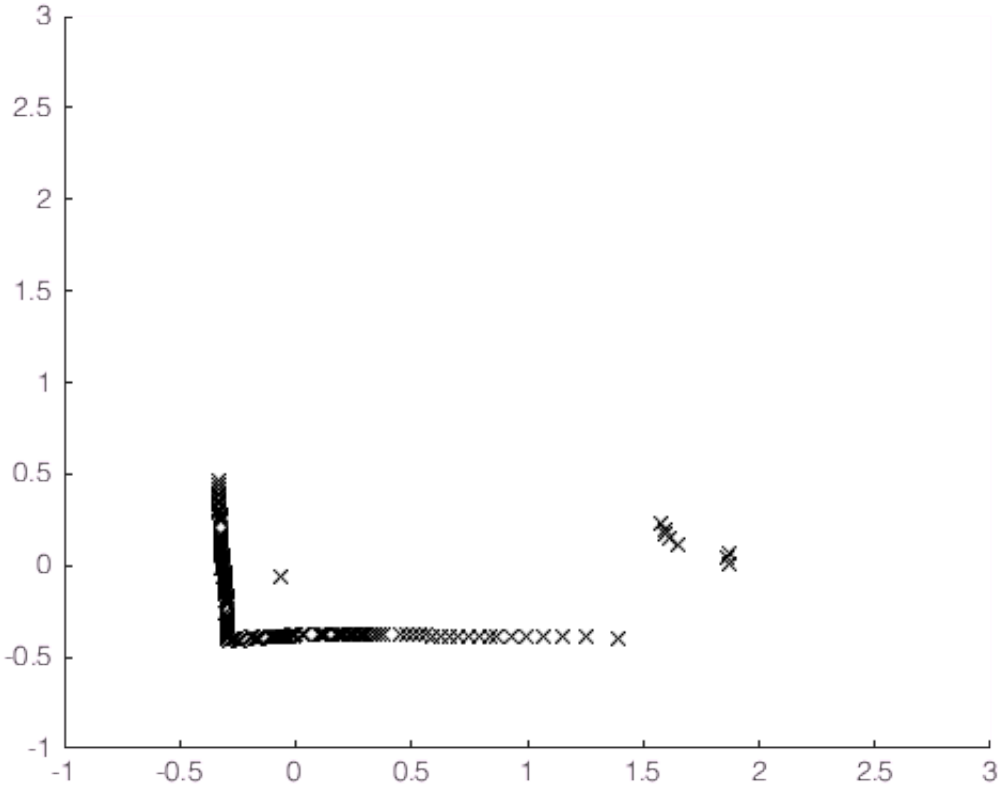
1)

```
d = 0.0889; %m
[x1,y1] = pol2cart(deg2rad(theta_1),r_1);
x1 = x1 - d;
clf
hold on
plot(x1,y1,'kx')
axis([-1,3,-1,3])
```



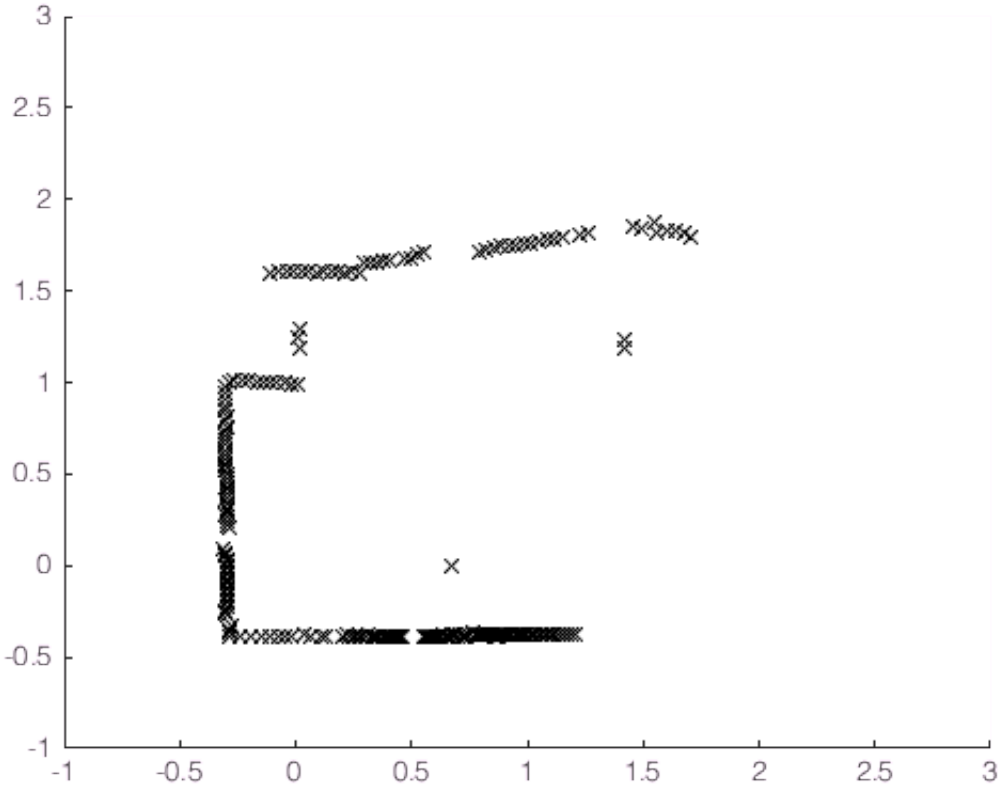
2)

```
figure
clf
[x2,y2] = pol2cart(deg2rad(theta_2),r_2);
x2 = x2 - d;
R = [cosd(45) -sind(45); sind(45) cosd(45)];
M = R*[x2';y2'];
hold on
axis([-1,3,-1,3])
plot(M(1,:),M(2,:),'kx')
```



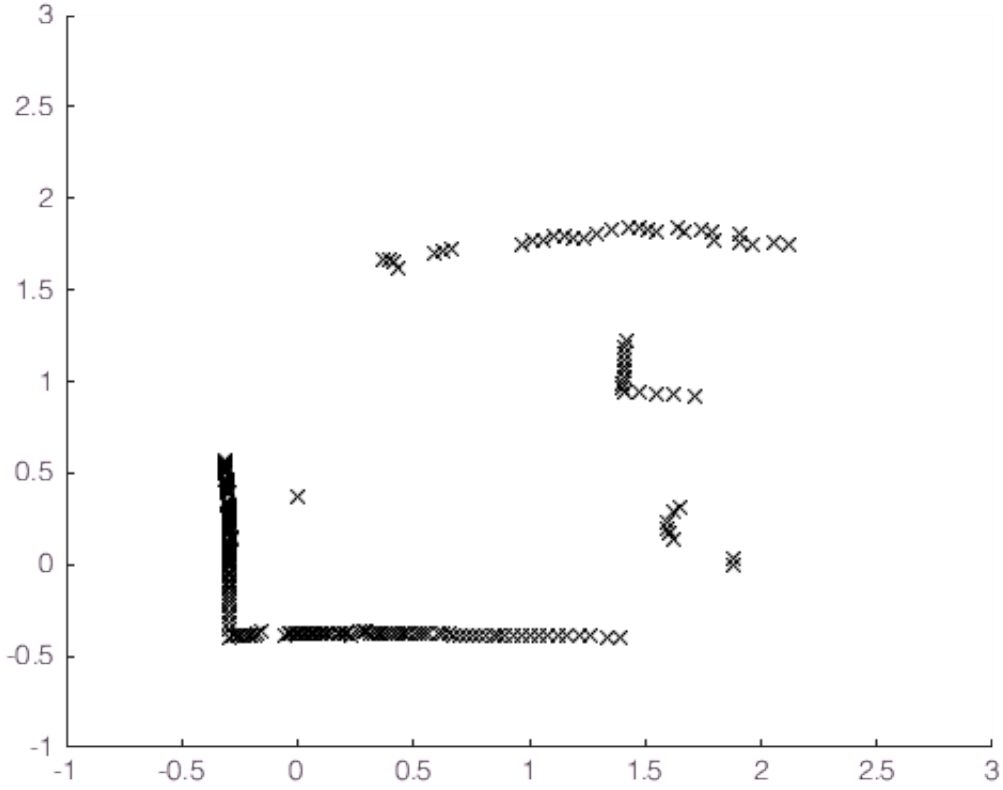
3)

```
figure
clf
[x3,y3] = pol2cart(deg2rad(theta_3),r_3);
x3 = x3 - d + 0.762;
hold on
axis([-1,3,-1,3])
plot(x3,y3,'kx')
```



4)

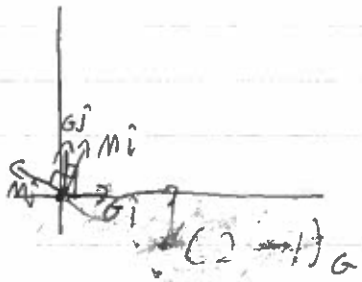
```
figure
clf
[x4,y4] = pol2cart(deg2rad(theta_4),r_4);
x4 = x4 - d;
R = [cosd(90) -sind(90) 0; sind(90) cosd(90) 0.4572; 0 0 1];
M = R*[x4';y4';ones(1,length(x4))];
hold on
axis([-1,3,-1,3])
plot(M(1,:),M(2,:),'kx')
```

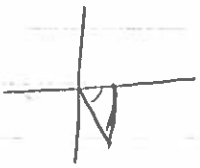

3
2.5
2
1.5
1
0.5
0
-0.5
-1
-1
-0.5
0
0.5
1
1.5
2
2.5
3

QEA Day 6

1)

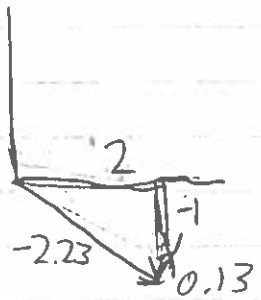
a)





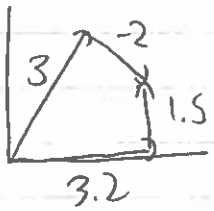
b)

$$\begin{pmatrix} \frac{1}{2} & \frac{\sqrt{3}}{2} \\ -\frac{\sqrt{3}}{2} & \frac{1}{2} \end{pmatrix} \begin{pmatrix} 2 \\ -1 \end{pmatrix} = \begin{pmatrix} 1 - \frac{\sqrt{3}}{2} \\ -\sqrt{3} - \frac{1}{2} \end{pmatrix} = \begin{pmatrix} 0,13 \\ -2.23 \end{pmatrix}$$



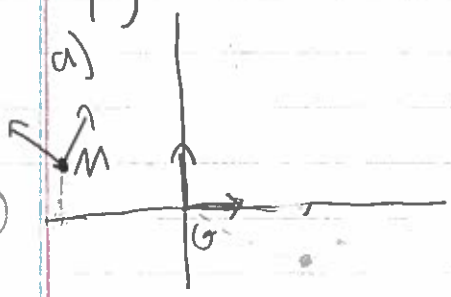
c)

$$\begin{pmatrix} \frac{1}{2} & -\frac{\sqrt{3}}{2} \\ \frac{\sqrt{3}}{2} & \frac{1}{2} \end{pmatrix} \begin{pmatrix} 3 \\ -2 \end{pmatrix} = \begin{pmatrix} \frac{3}{2} + \sqrt{3} \\ \frac{3\sqrt{3}}{2} - 1 \end{pmatrix} \approx \begin{pmatrix} 3.2 \\ 1.5 \end{pmatrix}$$

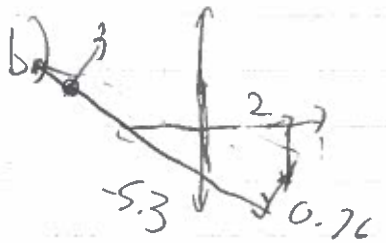


1)

a)

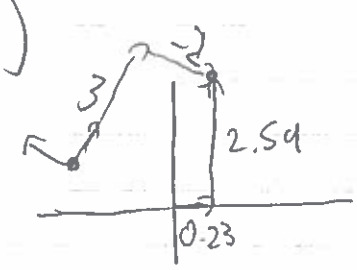


b)



$$\begin{bmatrix} \frac{1}{2} & \frac{\sqrt{3}}{2} & 0 \\ -\frac{\sqrt{3}}{2} & \frac{1}{2} & 0 \\ 0 & 0 & 1 \end{bmatrix}\begin{bmatrix} 1 & 0 & 3 \\ 0 & 1 & -1 \\ 0 & 0 & 1 \end{bmatrix}\begin{bmatrix} 2 \\ -1 \\ 1 \end{bmatrix} = \begin{bmatrix} \frac{5}{2}-\sqrt{3} \\ -\frac{5\sqrt{3}}{2}-1 \\ 1 \end{bmatrix} \approx \begin{pmatrix} 0.76 \\ -5.3 \end{pmatrix}$$

c)



$$\begin{bmatrix} 1 & 0 & -3 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{bmatrix}\begin{bmatrix} \frac{1}{2} & -\frac{\sqrt{3}}{2} & 0 \\ \frac{\sqrt{3}}{2} & \frac{1}{2} & 0 \\ 0 & 0 & 1 \end{bmatrix}\begin{bmatrix} 3 \\ -2 \\ 1 \end{bmatrix} = \begin{bmatrix} -\frac{3}{2} & +\sqrt{3} \\ \frac{3\sqrt{3}}{2} \\ 1 \end{bmatrix} \approx$$

$$\begin{pmatrix} 0.23 \\ 2.59 \\ 1 \end{pmatrix}$$

1) $\begin{pmatrix} r\cos\theta \\ r\sin\theta \end{pmatrix}$

2) $\begin{pmatrix} r\cos\theta - d \\ r\sin\theta \end{pmatrix}$

3) $\begin{pmatrix} 1 & 0 & X_N \\ 0 & 1 & Y_N \\ 0 & 0 & 0 \end{pmatrix}\begin{pmatrix} \cos\phi & -\sin\phi & 0 \\ \sin\phi & \cos\phi & 0 \\ 0 & 0 & 1 \end{pmatrix}\begin{pmatrix} r\cos\theta - d \\ r\sin\theta \\ 1 \end{pmatrix}\begin{pmatrix} 1 & \cdots \\ \vdots & \ddots \\ 1 & 1 \end{pmatrix}$

$$\begin{pmatrix} X_n - d\cos\phi + r\cos(\theta+\phi) \\ Y_n - d\sin\phi + r\sin(\theta+\phi) \\ 1 \end{pmatrix}$$