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```
x = [0 pi/4 pi/2 3*pi/2 pi 5*pi/4 3*pi/2 7*pi/4 2*pi]'/2;
```

```
x = linspace(0,pi,9)';  
d = [  
    0.39    2.2613  
    0.78    2.1120  
    1.17    1.8610  
    1.57    1.5078  
    1.96    1.0732  
    2.35    0.6983  
    2.81    0.3757  
    3.14    0.2924]
```

```
r = 1;  
t = 0.2;  
s = 0.01;  
n = length(x);
```

```
y = 1.5+ r*cos(x) - t*(cos(x).^2) + s * randn(n,1);
```

```
x = d(:,1);  
y = d(:,2);
```

```
% question 1
```

```
X = [cos(x) ones(n,1)];  
X'*X,  
X'*y,  
aa = X\y
```

```
% question 2
```

```
e = y - X*aa;  
s2 = e'*e/(n-2)
```

```
%question 3
```

```
b = aa(2);  
a = aa(1);
```

```
mx = mean(x);  
ssx = sum((x-mean(x)).^2);
```

```

ssy = sum((y-mean(y)).^2);
ssz = sum((a*cos(x)+b-mean(y)).^2);
R2 = ssz/ssy
R2 = 0.01*round(100*R2)
text(.6,-1,['R^2 = ' num2str(R2)],'FontSize',14,'Color','r','FontName','Arial')

```

```

% question 4 : levier

```

```

H = X*inv(X'*X)*X';
h = diag(H);
h(1),h(end),

```

```

% question 5

```

```

plot(cos(x),y-X*aa,'o')
hold off
[x, y, cos(x), y-X*aa]

```

```

%question 6

```

```

p = [cos(2.5) 1]*aa
t = 1-icdf('t',0.025,n-2)
pm = t*sqrt(s2)*sqrt(1+1/n+(2.5-mx)/ssx)
[p-pm , p+pm]

```

```

% Question 7

```

```

t= (a - 1)/sqrt(s2/ssx)
pval = (1-cdf('t',abs(t),n-2))

```

```

% pour le fun...

```

```

p = 2;
z = X*aa;
e = y-z;
err = e'*e/(n-p);
r = e./sqrt(err*(1-h));
ei = e./(1-h);
t = r.*sqrt((n-p-1)./(n-p-r.^2));
c = r.*r.*(h./(p.*(1-h)));
DF = t.*sqrt((h)./(1-h));

```

```

fprintf(1,' x y e h r ei t c DF \n');
fprintf(1,'-----\n');
fprintf(1,'%6.2f %6.2f %6.2f %6.2f %6.2f %6.2f %6.2f %6.2f %6.2f \n',[cos(x) y e h r ei t c DF \n');

```

d =

0	2.2968
0.3900	2.2613
0.7800	2.1120
1.1700	1.8610
1.5700	1.5078
1.9600	1.0732
2.3500	0.6983
2.8100	0.3757
3.1400	0.2924

ans =

5.0449	-0.0009
-0.0009	9.0000

ans =

5.0715
12.4785

aa =

1.0055
1.3866

s2 =

0.0071

R2 =

0.9903

R2 =

0.9900

ans =

0.3094

ans =

0.3093

ans =

0	2.2968	1.0000	-0.0953
0.3900	2.2613	0.9249	-0.0553
0.7800	2.1120	0.7109	0.0106
1.1700	1.8610	0.3902	0.0821
1.5700	1.5078	0.0008	0.1204
1.9600	1.0732	-0.3795	0.0681
2.3500	0.6983	-0.7027	0.0183
2.8100	0.3757	-0.9455	-0.0602
3.1400	0.2924	-1.0000	-0.0887

p =

0.5810

t =

3.3646

pm =

0.3126

ans =

0.2684 0.8936

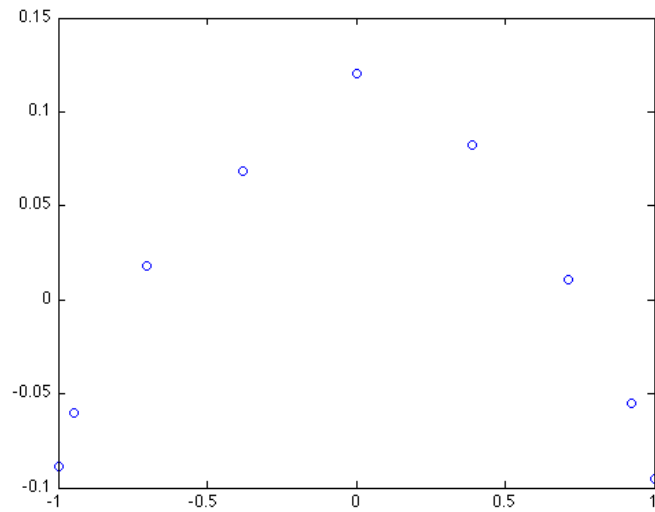
t =

0.2004

```
pval =
```

```
0.4234
```

x	y	e	h	r	ei	t	c	DF
1.00	2.30	-0.10	0.31	-1.36	-0.14	-1.46	0.41	-0.98
0.92	2.26	-0.06	0.28	-0.77	-0.08	-0.75	0.12	-0.47
0.71	2.11	0.01	0.21	0.14	0.01	0.13	0.00	0.07
0.39	1.86	0.08	0.14	1.05	0.10	1.06	0.09	0.43
0.00	1.51	0.12	0.11	1.51	0.14	1.71	0.14	0.60
-0.38	1.07	0.07	0.14	0.87	0.08	0.85	0.06	0.34
-0.70	0.70	0.02	0.21	0.24	0.02	0.23	0.01	0.12
-0.95	0.38	-0.06	0.29	-0.84	-0.08	-0.82	0.14	-0.52
-1.00	0.29	-0.09	0.31	-1.26	-0.13	-1.33	0.36	-0.89



```
exercice 2
```

```
% question 1
```

```
u = (-0.46+1)/sqrt(0.09)
```

```
pval = 1-cdf('norm',u,0,1)
```

```
%
```

```
% question 2
```

```
m1 = -0.78;
```

```
m2 = -0.98;
```

```
n1 = 9;
n2 = 13;
u = (m1-m2)/sqrt(0.09*(1/n1+1/n2))
pval = 1-cdf('norm',abs(u),0,1)
```

```
% question 3
```

```
hsig2 = 1/20*(n1*0.0729+n2*0.1024)
t = (m1-m2)/sqrt(hsig2*(1/n1+1/n2))
pval = 1-cdf('t',abs(t),20)
```

```
% question 4
```

```
sig2 = 0.09;
u = icdf('norm',0.01,0,1)
n = u^2*2*sig2/((m1-m2)^2)
```

```
u =
```

```
1.8000
```

```
pval =
```

```
0.0359
```

```
u =
```

```
1.5374
```

```
pval =
```

```
0.0621
```

```
hsig2 =
```

```
0.0994
```

```
t =
```

```
1.4632
```

```
pval =  
    0.0795
```

```
u =  
   -2.3263
```

```
n =  
   24.3535
```

exercice 3

```
%question 1 :  
% bonne rponse 3  
% la 5 est acceptable
```

```
%question 2  
% 1, 2 et 5
```

```
%question 3  
% 4 et 5
```

```
%question 4  
% 1 et 5
```

exercice 4

```
%question 1  
% non c'est un cecle (quadratique  
% oui en posant  $c = r^2 - a^2 - b^2$ , masi dans ce cas on doit avoir  
%  $c > a^2 + b^2$  car le rayon est positif.
```

```
%question 2
```

```
% question 3
```