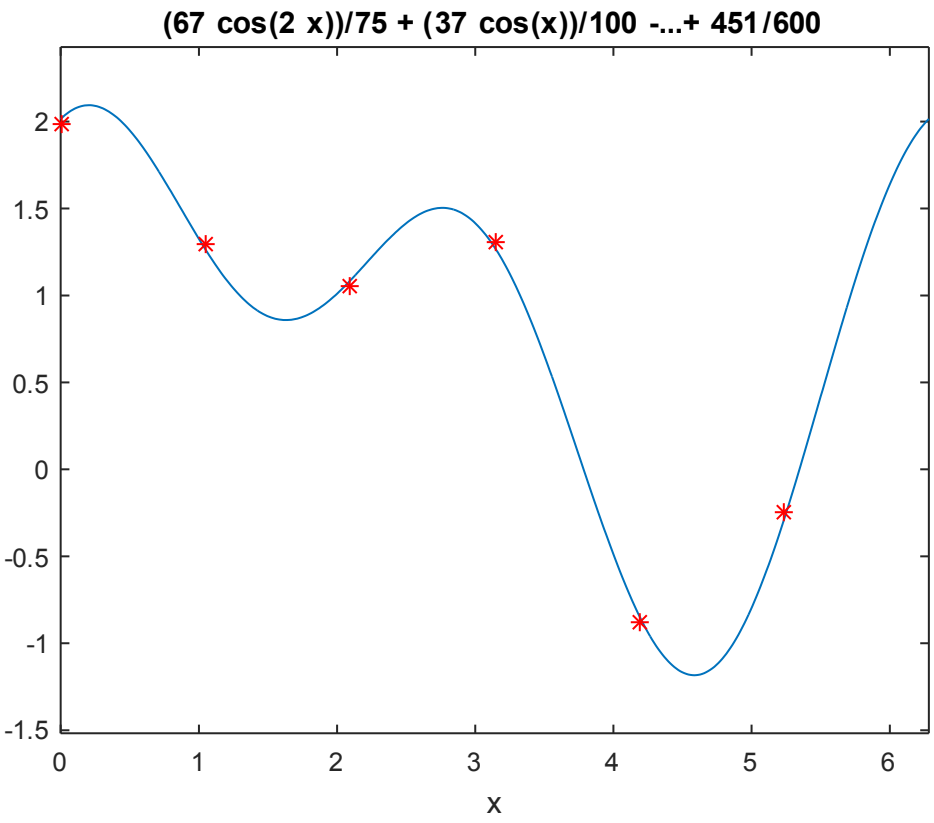
Harmonic Analysis

```
clc
clear all
syms x
p=input('Enter the period:');
l=p/2;
X=input('Enter the X-vector:');
Y=input('Enter the Y-vector:');
N=length(X);
r=input('Enter the number of terms in series:');
a_0=(2/N)*sum(Y);
for n=1:r
    a(n)=(2/N)*sum(Y.*cos(n*pi*X/l));
    b(n)=(2/N)*sum(Y.*sin(n*pi*X/l));
end
for n=1:r
    H(n)=a(n)*cos(n*pi*x/l)+b(n)*sin(n*pi*x/l);
end
HS=(a_0)/2+sum(H);
disp('Harmonic series is given by')
disp(HS)
ezplot(HS,[0,p])
hold on
plot(X,Y,'r*')
```

Problem-1 :-

```
Enter the period:2*pi
Enter the X-vector:[0,pi/3,2*pi/3,pi,4*pi/3,5*pi/3]
Enter the Y-vector:[1.98,1.30,1.05,1.31,-0.88,-0.25]
Enter the number of terms in series:2
Harmonic series is given by
(67*cos(2*x))/75 + (37*cos(x))/100 - (19*3^(1/2)*sin(2*x))/300 + (29*3^(1/2)*sin(x))/50 + 451/600
```



Problem-2 :-

Enter the period:6

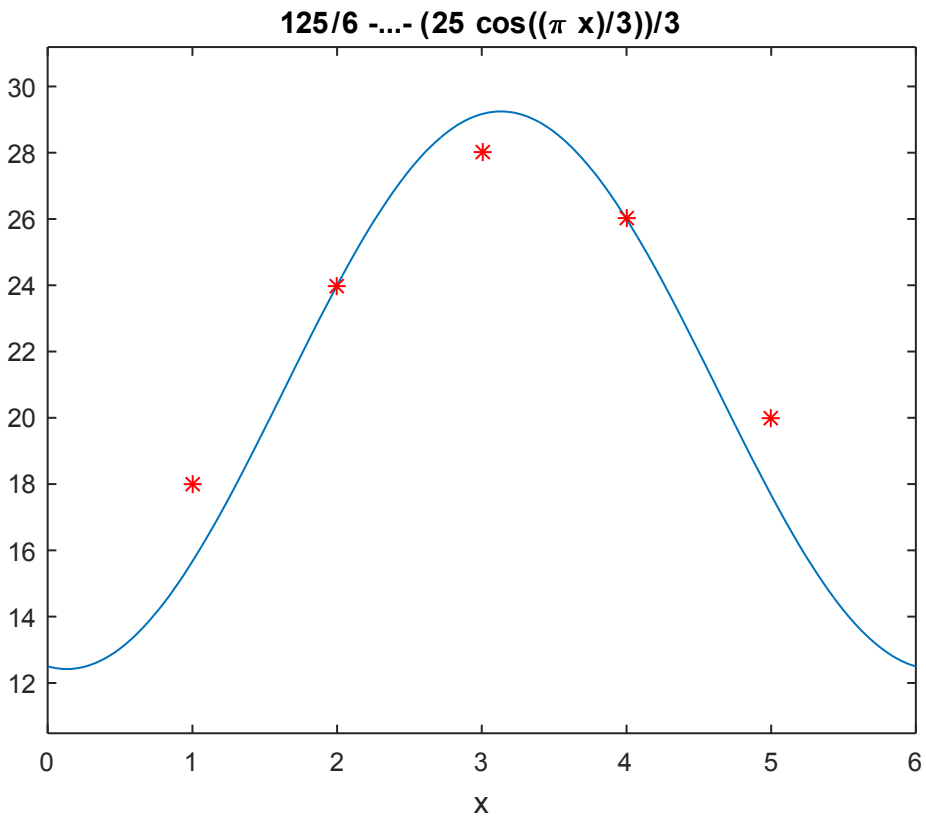
Enter the X-vector:[0,1,2,3,4,5]

Enter the Y-vector:[9,18,24,28,26,20]

Enter the number of terms in series:1

Harmonic series is given by

125/6 - (2*3^(1/2)*sin((pi*x)/3))/3 - (25*cos((pi*x)/3))/3


125/6 -...- (25 cos((π x)/3))/3
30
28
26
24
22
20
18
16
14
12
0
1
2
3
4
5
6
x