1. Given the data as listed below

x	4.0	4.2	4.5	4.7	5.1	5.5	5.9	6.3
y	102.6	113.2	130.1	142.1	167.5	195.1	224.9	256.8

a. Construct the least squares approximation of degree two and compute the error.

b. Construct the least squares approximation of the form be^{ax} and compute the error.

c. Construct the least squares approximation of the form bx^n and compute the error.

```
PS C:\Users\afatf\Desktop\E94116067_numerical_hw8>
(a)
a = 6.6912 , b = -1.8837 , c = 3.0864
Error: 0.0052


(b)
a = 0.3985 , b = 21.4445
Error: 94.9830


(c)
n = 2.0196 , b = 6.2390
Error: 0.0117
```

2. Find the least squares polynomial approximation of degree two on the interval $[-1,1]$ for the function $f(x) = \frac{1}{2}\cos x + \frac{1}{4}\sin 2x$

```
PS C:\Users\afatf\Desktop\E94116067_numerical_hw8>
a = -0.2326 , b = 0.3265 , c = 0.4983
Error: 0.0032
```

3. Determine the discrete least squares trigonometric polynomial S_4

using $m=16$ for $f(x)=x^2 \sin x$ on the interval $[0,1]$.

b. Compute $\int_0^1 S_4(x)dx$

c. Compare the integral in part (b) to $\int_0^1 x^2 \sin xdx$

d. Compute the error $E(S_4)$

```
PS C:\Users\afatf\Desktop\E94116067_numerical_hw8>
(a)
a0 = 0.4592
a1 = -0.1468 , b1 = 0.2323
a2 = 0.0546 , b2 = -0.1249
a3 = -0.0389 , b3 = 0.0829
a4 = 0.0335 , b4 = -0.0609
(b)
Ans: 0.2296
(c)
Absolute: 0.0064 , Relative: 2.8482%
(d)
Error: 0.5056
```