數值方法_作業八_E14101082_陳政謙

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\user\Desktop\E14101082_numerical_hw8> cd "c:\Use
(a) Quadratic Fit: y = 6.691184x^2 + -1.883746x + 3.086393
    Error: 0.005246
(b) Exponential Fit: y = 21.444544 * e^(0.398495x)
    Error: 94.983021
(c) Power Fit: y = 6.238952 * x^2.019634
    Error: 0.011721
```

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\user\Desktop\E14101082_numerical_hw8> cd "c:\
Second-degree Least Squares Approximation on [-1, 1]:
P(x) = 0.498279 + 0.225876*x + -0.232631*x^2
```

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 $\int_0^1 x^2\sin x dx$

d. Compute the error $E(S_4)$

```
PS C:\Users\user\Desktop\E14101082_numerical_hw8> cd "c:\Users\user\Deskt
(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
```