

數值方法作業 HW8

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Q1:

```
chenyian@chenyiandeMacBook-Air-2 F54091196_numerical_hw8
Desktop/F54091196_numerical_hw8/question1.py
=== Least Squares Approximation Results ===
(a) Quadratic:  $y = 6.6912x^2 + -1.8837x + 3.0864$ 
    Error = 0.0052
(b) Exponential:  $y = 21.4445 * e^{(0.3985x)}$ 
    Error = 94.9830
(c) Power:  $y = 6.2390 * x^{2.0196}$ 
    Error = 0.0117
```

Q2:

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Least Squares Polynomial Approximation (degree 2):
P2(x) = 0.4983 + 0.3263x + -0.2326x^2
L2 Error = 0.003241
```

Q3:

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===== (a) Fourier Coefficients of S4(x) =====
a0 = 0.197672
a1 = 0.072827, b1 = -0.237249
a2 = -0.022262, b2 = -0.123859
a3 = -0.038390, b3 = -0.077809
a4 = -0.043865, b4 = -0.052223

===== (b), (c), (d) Results =====
(b)  $\int_0^1 S_4(x) dx \approx 0.197672$ 
(c)  $\int_0^1 x^2 \sin(x) dx \approx 0.223244$ 
    差值  $\approx 0.025572$ 
(d)  $E(S_4) \approx 0.077402$ 
```