1.

```
In [4]: runfile('C:/Users/ericd/untitled0.py', wdir='C:/Users/ericd')
Numerical Integration Results:
Trapezoidal Method: 0.396148
Simpson Method:     0.385664
Midpoint Method:    0.380805
Exact Result:       0.385936
```

2.

```
In [5]: runfile('C:/Users/ericd/untitled1.py', wdir='C:/Users/ericd')
Gaussian Quadrature Results:
n=3: 0.19225938, Error: 0.00000002
n=4: 0.19225936, Error: 0.00000000
Exact: 0.19225936
```

3.

```
In [14]: runfile('C:/Users/ericd/untitled2.py', wdir='C:/Users/ericd')
精確值 (Exact value)                        = 0.5118446
Simpson's Rule (n=4, m=4) 結果             = 0.5119875
Gaussian Quadrature (n=3, m=3) 結果        = 0.5118655

Simpson's Rule 誤差                         = 0.0001429
Gaussian Quadrature 誤差                    = 0.0000209
```

4.

```
In [19]: runfile('C:/Users/ericd/untitled3.py', wdir='C:/Users/ericd')
Composite Simpson's Rule (n=4):
a. \int_0^1 x^(-1/4) \sin x dx ≈ 6.94708410, True value: 0.52840808
b. \int_1^∞ x^(-4) \sin x dx ≈ 0.27448161, True value: 0.28652954
Error a: 6.41867602
Error b: 0.01204792
```