Assignment 4

1. Write a program for generalised least squares and use it to fit the following data with the functions suggested. Plot the line as well as the points on a x-y plot and visualise.

x	0.03	0.17	0.31	0.44	0.56
y	0.00	2.50	5.00	7.50	10.0

Function $y = mx + c$

(b)

x	y
1.8	0.28
2.2	0.36
5	0.99
9	2.5
10	2.8

Function $y = ax^n$

2. Consider

$$\int_0^{0.4\pi} Sec^2\theta \, d\theta$$

Let us assume that we are going to perform Romberg integration procedure.

(a) First divide the domain into one strip and apply trapezoidal rule to get value of the integral.
(b) Then proceed to perform integration with two strips.
(c) Note that in both of the above steps, the order of accuracy is 2. Now having obtained for 2h and h, perform the Romberg formula to obtain fourth order accurate result.
(d) Now repeat the steps with 4, 8 and 16 strips and also apply the Romberg's formula to get more and more accurate results,
(e) You will note that with 16 strips, we will see that normalised error is $<10^{-4}$.