ACM40660 Assignment-1
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Q1] * we have to calculate values of α & β for the following data points:
(1, 2) (2, 4) (3, 3) (4, 5) on paper

⟹ given:
data points:- (1,2)(2,4)(3,3)(4,5)

linear regression: α :

$$\alpha = \frac{n \Sigma(x_i y_i) - \Sigma x_i \Sigma y_i}{n \Sigma(x_i^2) - (\Sigma x_i)^2}$$

n = number of data points.
x_i & y_i = co-ordinates of data points

for β (intercept:

$$\beta = \frac{\Sigma y_i - \alpha \Sigma x_i}{n}$$

In this example $n = 4$ and data points are (1, 2)(2, 4)(3, 3)(4, 5)
we have to calculate

x_i	y_i	$x_i y_i$	x_i^2
1	2	2	1
2	4	8	4
3	3	9	9
4	5	20	16

$\Sigma x_i = 10$ $\Sigma y_i = 14$ $\Sigma x_i y_i$ $\Sigma x_i^2 = 30$

11

39

Calculating α

$$\alpha = \frac{4 \times 39 - 10 \times 14}{4 \times 30 - 10^2}$$

$$= \frac{156 - 140}{120 - 100}$$

$$= \frac{16}{20}$$

$$\boxed{\alpha = 0.8}$$

Calculating β:

we will use calculated α to find β

$$\beta = \frac{14 - 0.8 \times 10}{4}$$

$$= \frac{14 - 8}{4}$$

$$= \frac{6}{4}$$

$$\boxed{\beta = 1.5}$$

line Equation will be:

$$\boxed{Y = 0.8x + 1.5}$$

Q2] e] calculate the first term of determinant formula given in (b) on paper ①
b] point is :-
write a function ~~to~~ that calculates determinant of any 3x3 matrix

→ Determinant of 3x3 matrix

$$A = \begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix}$$ so the determinant is:

$$\det(A) = a(ei - fh) - b(di - fg) + c(dh - eg)$$

calculation for first term:

$a(ei - fh)$

breaking down it

① multiply e and i
- compute ei

② multiply f & h
- compute fh

③ ~~multiply~~ subtract fh from ei
- compare ei − fh

④ multiply by a
- compute a(ei − fh)

ex = $$A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$$

a = 1	b = 2	c = 3
d = 4	e = 5	f = 6
g = 7	h = 8	i = 9

Now, we will calculate First term ei

① calculate ei

$ei = 5 \times 9 = 45$

② calculate fh

$fh = 6 \times 8 = 48$

③ compute ei − fh

$ei - fh = 45 - 48$

$= -3$

④ multiply by a :

$a(ei - fh) = 1 \times -3$

$= -3$

∴ The first term $a(ei - fh)$ is $= -3$

This is how we calculated first term.

Assignment 1

Scientific Programming

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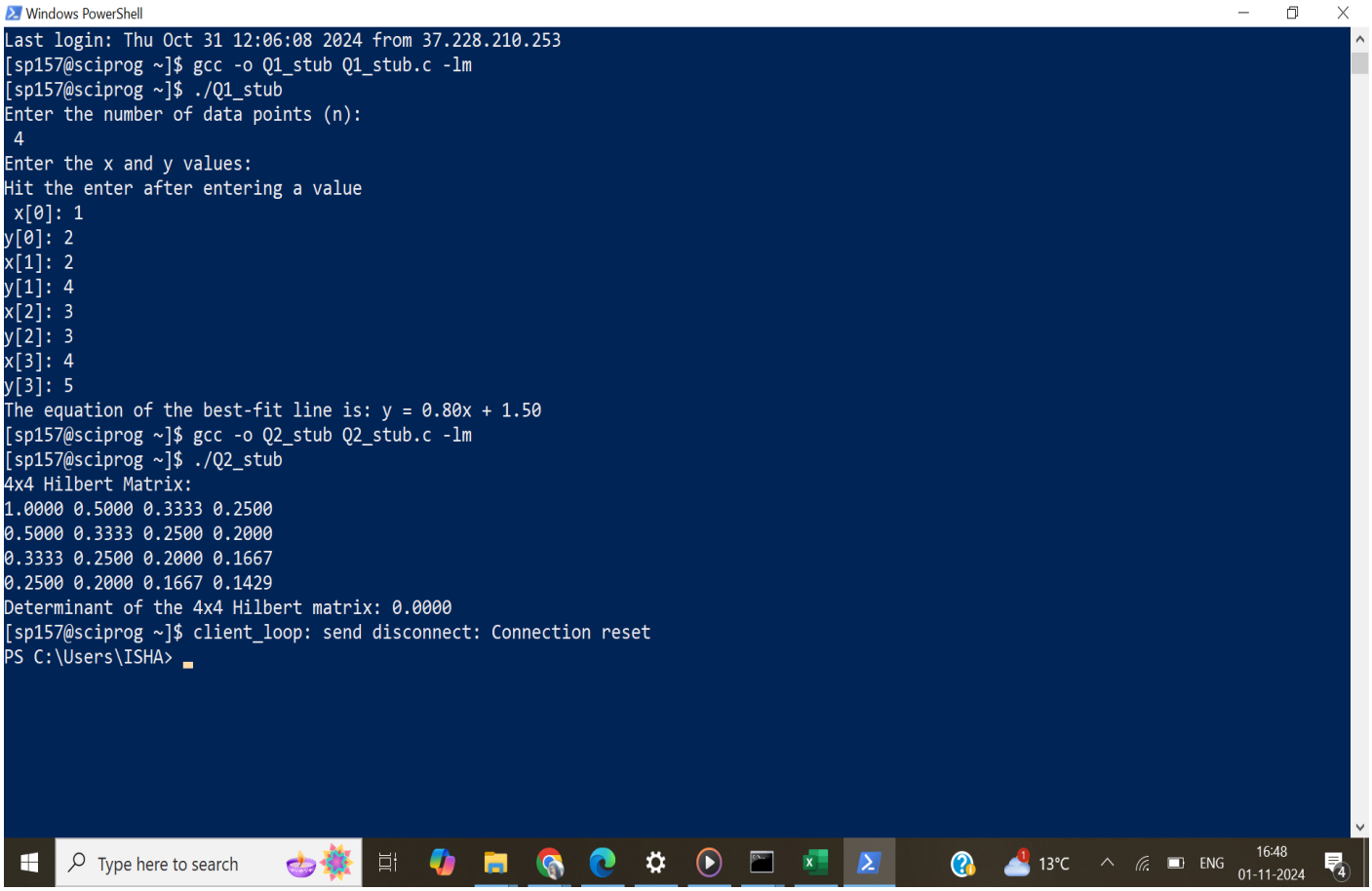
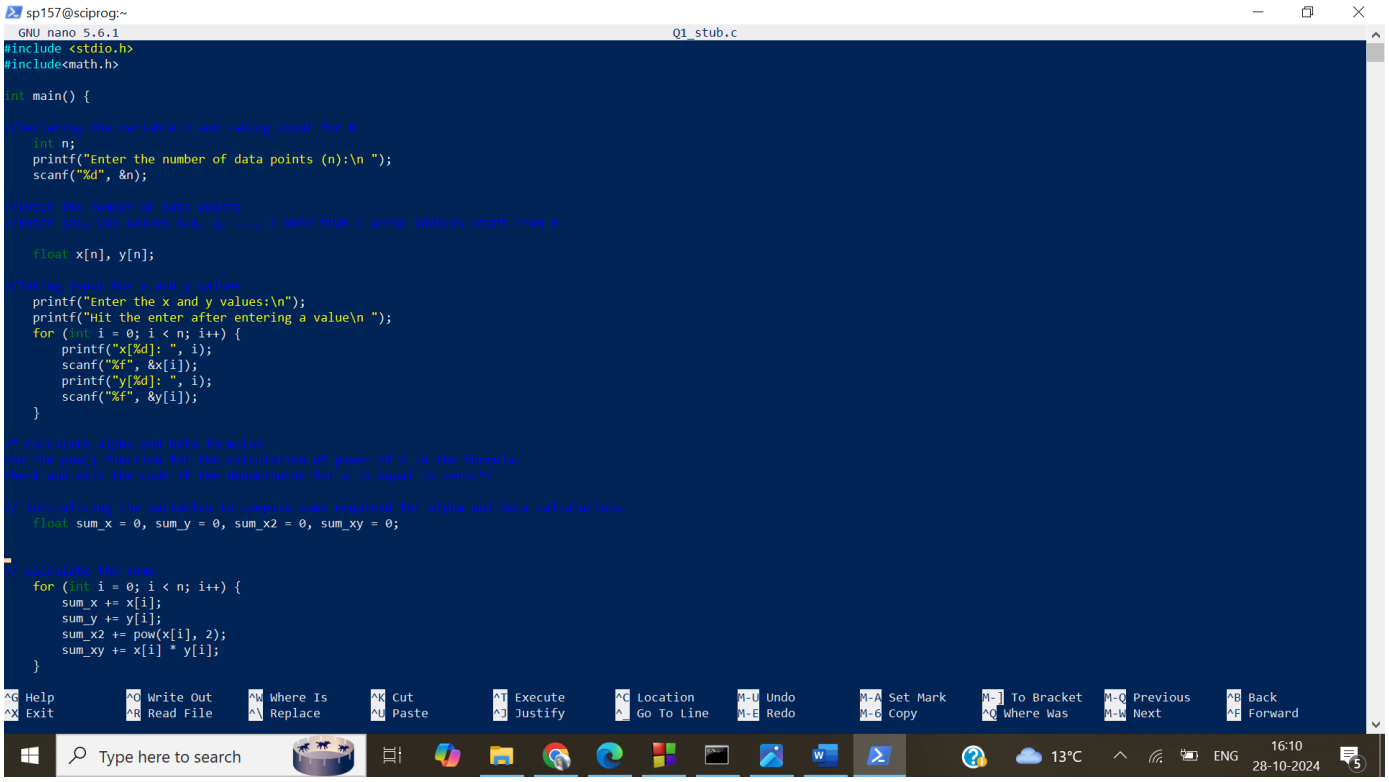
Here I coded, compiled and run both programs in C on Sciprog. I am attaching output of both programs, screenshot of code which is done on Sciprog as well as code of .c File.

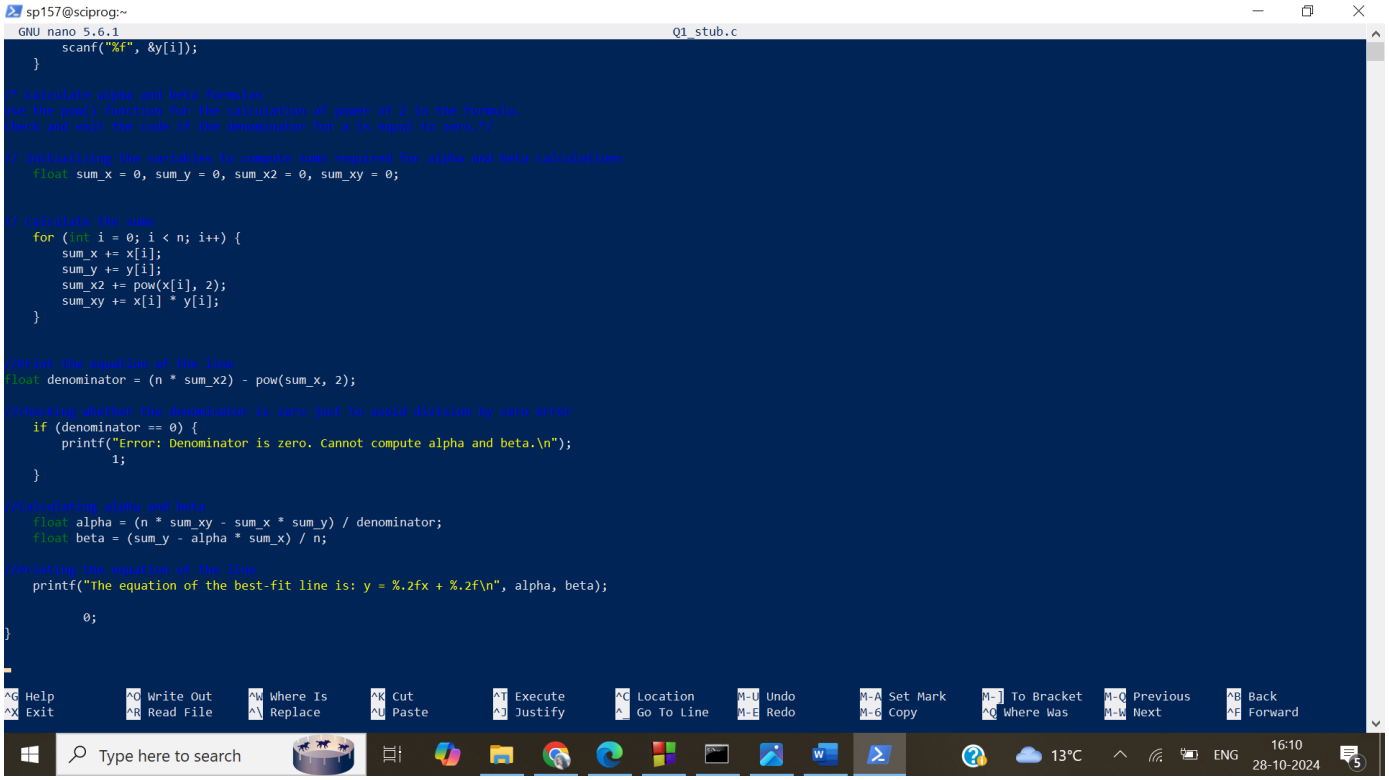
Output of Program Q1.stub and Q2.stub

The input for Q1.stub file is the data points which are in the Assignment1 file.

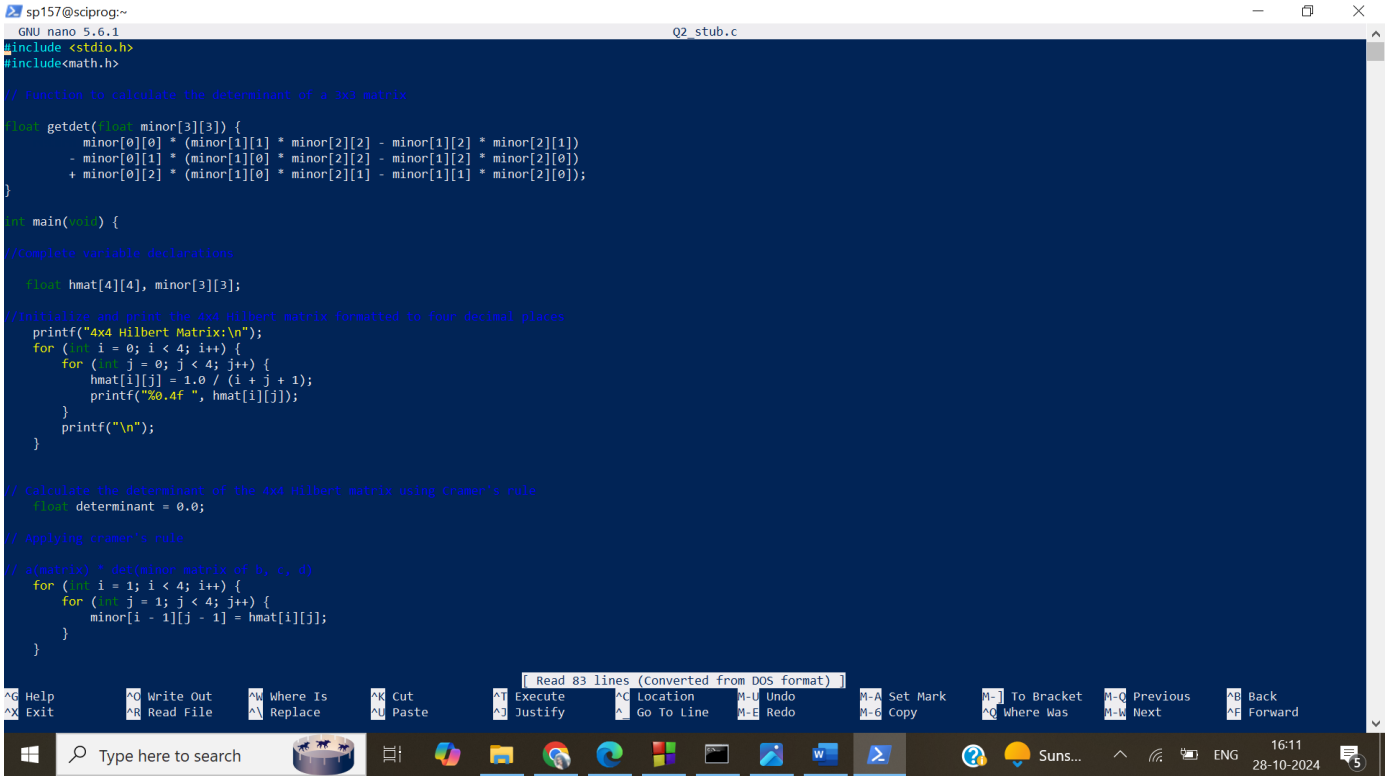


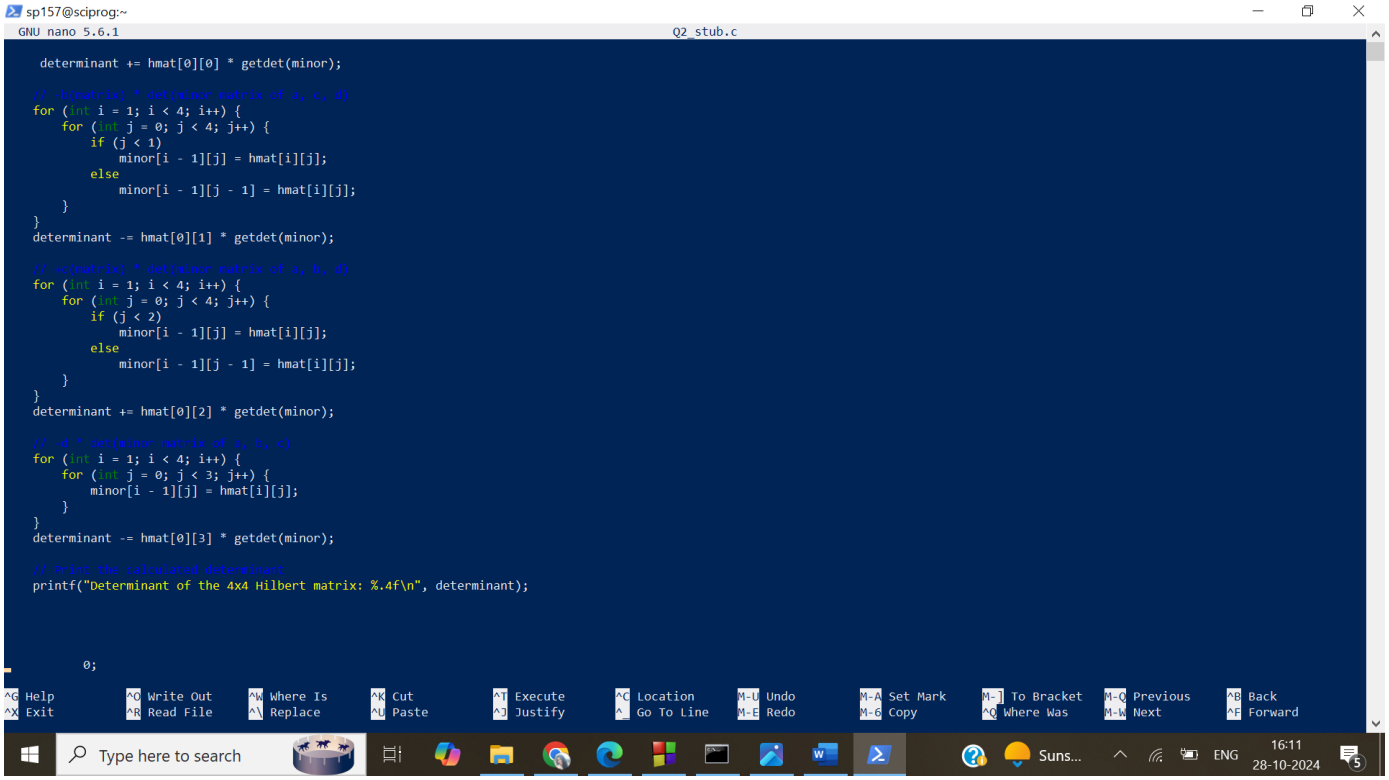
Q1.Stub.c File sciprog





Q1.Stub.c File on sciprog




sp157@sciprog:~
GNU nano 5.6.1
Q2_stub.c
determinant += hmat[0][0] * getdet(minor);
// -b(matrix) * det(minor matrix of a, c, d)
for (int i = 1; i < 4; i++) {
for (int j = 0; j < 4; j++) {
if (j < 1)
minor[i - 1][j] = hmat[i][j];
else
minor[i - 1][j - 1] = hmat[i][j];
}
}
determinant -= hmat[0][1] * getdet(minor);
// +c(matrix) * det(minor matrix of a, b, d)
for (int i = 1; i < 4; i++) {
for (int j = 0; j < 4; j++) {
if (j < 2)
minor[i - 1][j] = hmat[i][j];
else
minor[i - 1][j - 1] = hmat[i][j];
}
}
determinant += hmat[0][2] * getdet(minor);
// -d * det(minor matrix of a, b, c)
for (int i = 1; i < 4; i++) {
for (int j = 0; j < 3; j++) {
minor[i - 1][j] = hmat[i][j];
}
}
determinant -= hmat[0][3] * getdet(minor);
// Print the calculated determinant
printf("Determinant of the 4x4 Hilbert matrix: %.4f\n", determinant);
0;
^G Help ^O Write Out ^W Where Is ^K Cut ^T Execute ^C Location M-U Undo M-A Set Mark M-] To Bracket M-Q Previous ^B Back
^X Exit ^R Read File ^\ Replace ^U Paste ^J Justify ^_ Go To Line M-E Redo M-6 Copy ^Q Where Was M-W Next ^F Forward
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