```
% NAME: ADITYA BARMAN
% ROLL: 002320601024
% PROBLEM 1. Mean without Frequency


clc, clearvars, close all

weights_pounds = [122, 173, 179, 176, 159, 175, 160, 102, 133
159, 176, 151, 115, 105, 72, 170, 128, 112
101, 123, 117, 93, 117, 99, 90, 113, 128
129, 134, 178, 105, 107, 147, 157, 155, 95
177, 98, 174, 135, 97, 168, 160, 144, 174];

sum_wts_pds = 0;

for i = 1:5
    for j = 1:9
        sum_wts_pds = (sum_wts_pds + weights_pounds(i, j));
    end
end

mean_weight = (sum_wts_pds/45);
fprintf('Mean of the data is: %.4f\n', mean_weight);


% ============== OUTPUT =============

% Mean of the data is: 135.1556

% ===================================
```

```
% NAME: ADITYA BARMAN
% ROLL: 002320601024
% PROBLEM 2. Mean with Frequency


clc, clearvars, close all

f = [15, 20, 30, 18, 12, 5];
f_total = 0;
f_m_total = 0;

up_bd = [23, 28, 33, 38, 43, 48];
lw_bd = [19, 24, 29, 34, 39, 44];
midpts = ((up_bd + lw_bd)/2);
f_m = f .* midpts;

for i = 1:6
    f_total = f_total + f(i);
    f_m_total = f_m_total + f_m(i);
end

mean_value = (f_m_total/f_total);
fprintf('Mean of the data is: %.4f\n', mean_value);


% ============== OUTPUT =============

% Mean of the data is: 31.3500

% ====================================
```

```
% NAME: ADITYA BARMAN
% ROLL: 002320601024
% PROBLEM 3. Variance without Frequency


clc, clearvars, close all

weights_pounds = [122, 173, 179, 176, 159, 175, 160, 102, 133
159, 176, 151, 115, 105, 72, 170, 128, 112
101, 123, 117, 93, 117, 99, 90, 113, 128
129, 134, 178, 105, 107, 147, 157, 155, 95
177, 98, 174, 135, 97, 168, 160, 144, 174];

sum_wts_pds = 0;

for i = 1:5
    for j = 1:9
        sum_wts_pds = (sum_wts_pds + weights_pounds(i, j));
    end
end

mean_weight = (sum_wts_pds/45);

sum_dist_mean = 0;

for x = 1:5
    for y = 1:9
        dist_mean = ((weights_pounds(x, y) - mean_weight)^2);
        sum_dist_mean = (sum_dist_mean + dist_mean);
    end
end

variance = (sum_dist_mean/45);
fprintf('Variance of the data is: %.4f\n', variance);


% ============== OUTPUT =============

% Variance of the data is: 930.7980

% ====================================
```

```
% NAME: ADITYA BARMAN
% ROLL: 002320601024
% PROBLEM 4. Variance with Frequency


clc, clearvars, close all

f = [15, 20, 30, 18, 12, 5];
f_total = 0;
f_m_total = 0;

up_bd = [23, 28, 33, 38, 43, 48];
lw_bd = [19, 24, 29, 34, 39, 44];
midpts = ((up_bd + lw_bd)/2);
f_m = f .* midpts;

for i = 1:6
    f_total = f_total + f(i);
    f_m_total = f_m_total + f_m(i);
end

mean_value = (f_m_total/f_total);

midpt_x = zeros(1, 6);

for j = 1:6
    m_sub_x = (midpts(j) - mean_value);
    midpt_x(j) = m_sub_x;
end

midpt_x_sq = midpt_x .* midpt_x;
f_m_x = zeros(1, 6);

for k = 1:6
    f_m_x_val = f(k)*midpt_x_sq(k);
    f_m_x(k) = f_m_x_val;
end

f_m_x_total = 0;

for z = 1:6
```

```
42      f_m_x_total = f_m_x_total + f_m_x(z);
43  end
44
45  variance = (f_m_x_total/f_total);
46  fprintf('Variance of the data is: %.4f\n', variance);
47
48
49  % ============== OUTPUT =============
50
51  % Variance of the data is: 47.6275
52
53  % ====================================
```

```
% NAME: ADITYA BARMAN
% ROLL: 002320601024
% PROBLEM 5. Co-variance without Frequency


clc, clearvars, close all

n_women = 12;
x_ages = [56, 42, 72, 36, 63, 47, 55, 49, 38, 42, 68, 60];
y_BP = [147, 125, 160, 118, 149, 128, 150, 145, 115, 140, 152, 155];

x_y = zeros(1, 12);
x_ages_sum = 0;
y_BP_sum = 0;
xy_sum = 0;

for i = 1:12
    x_ages_sum = x_ages_sum + x_ages(i);
    y_BP_sum = y_BP_sum + y_BP(i);
    x_y(i) = (x_ages(i) * y_BP(i));
end

for j = 1:12
    xy_sum = xy_sum + x_y(j);
end

x_mean = x_ages_sum / n_women;
y_mean = y_BP_sum / n_women;

covariance = (xy_sum - n_women * x_mean * y_mean) / n_women;

fprintf('Covariance between x and y: %.4f\n', covariance);


% ============== OUTPUT ===============

% Covariance between x and y: 147.0556

% ====================================
```

```
% NAME: ADITYA BARMAN
% ROLL: 002320601024
% PROBLEM 6. Co-variance with Frequency


clc, clearvars, close all

n = 100;
f_vals = [0 0 0 2 4 4
0 0 1 4 6 5
0 0 5 10 8 1
1 4 9 5 2 0
3 6 6 2 0 0
3 5 4 0 0 0];

% initializing upper and lower bounds for x & y
up_bd_x = [49 59 69 79 89 99];
up_bd_y = [99 89 79 69 59 49];
lw_bd_x = [40 50 60 70 80 90];
lw_bd_y = [90 80 70 60 50 40];

% initialiazing midpts and assumed means (same for x & y)
midpts_x = (up_bd_x + lw_bd_x) / 2;
midpts_y = (up_bd_y + lw_bd_y) / 2;
mean_asmd_xy = 74.5;
% obtaining factor from subtraction from assumed mean
diff_factor = 10;

% calculating u & v vals
u_vals = zeros(1, 6);

for i = 1:6
    u_vals(i) = ((midpts_x(i) - mean_asmd_xy) / diff_factor);
end

v_vals = u_vals(end:-1:1);

% initializing a 6x6 zero matrix to store fuv values
fuv = zeros(6, 6);
% following loop traverses through each cell and stores the required
value
```

```
41 for j = 1:6
42     for k = 1:6
43         fuv(j, k) = f_vals(j, k) * v_vals(j) * u_vals(k);
44     end
45 end
46
47
48 % initializing required matrices
49 % for v
50 f_v = [10 16 24 21 17 12]; % given
51 fv = zeros(1, 6);
52 fv_sq = zeros(1, 6);
53 f_uv = 0;
54
55 %for u
56 f_u = [7 15 25 23 20 10]; % given
57 fu = zeros(1, 6);
58 fu_sq = zeros(1, 6);
59
60 % calculating fu, fv, fu^2, fv^2
61 for a = 1:6
62     fv(a) = f_v(a) .* v_vals(a);
63     fv_sq(a) = f_v(a) .* (v_vals(a)^2);
64     fu(a) = f_u(a) .* u_vals(a);
65     fu_sq(a) = f_u(a) .* (u_vals(a)^2);
66 end
67
68 % calculating f_uv
69 for m = 1:36
70     f_uv = f_uv + fuv(m);
71 end
72 % calculating respective sums
73 fv_sum = 0;
74 fv_sq_sum = 0;
75 fu_sum = 0;
76 fu_sq_sum = 0;
77
78 for d = 1:6
79     fv_sum =fv_sum + fv(d);
80     fv_sq_sum =fv_sq_sum + fv_sq(d);
81     fu_sum =fu_sum + fu(d);
```

```
 82     fu_sq_sum =fu_sq_sum + fu_sq(d);
 83 end
 84
 85 % calculating square of summation of fu & fv respectively
 86 fu_sum_sq = fu_sum ^ 2;
 87 fv_sum_sq = fv_sum ^ 2;
 88
 89 % calculating co-variance between x & y
 90 corr_coeff_num = (n*f_uv) - (fu_sum*fv_sum);
 91 covar_xy = corr_coeff_num/100;
 92 % corr_coeff_denom = (sqrt((n*fu_sq_sum)-fu_sum_sq))*(sqrt↙
((n*fv_sq_sum)-fv_sum_sq));
 93 % corr_coeff = corr_coeff_num / corr_coeff_denom;
 94
 95 fprintf('Co-variance between the marks in Mathematics and the marks↙
in Physics is: %.4f\n', covar_xy);
 96
 97 % ====================== OUTPUT ==============================
 98
 99 % Co-variance between the marks in Mathematics and the marks in↙
Physics is: 160.2000
100
101 % ============================================================
```

```
% NAME: ADITYA BARMAN
% ROLL: 002320601024
% PROBLEM 7. Correlation without Frequency


clc, clearvars, close all

n_women = 12;
x_ages = [56, 42, 72, 36, 63, 47, 55, 49, 38, 42, 68, 60];
y_BP = [147, 125, 160, 118, 149, 128, 150, 145, 115, 140, 152, 155];

x_y = zeros(1, 12);
x_sq = zeros(1, 12);
y_sq = zeros(1, 12);

for i = 1:12
    x_y(i) = (x_ages(i) * y_BP(i));
    x_sq(i) = (x_ages(i) ^ 2);
    y_sq(i) = (y_BP(i) ^ 2);
end

x_ages_sum = 0;
y_BP_sum = 0;
x_y_sum = 0;
x_sq_sum = 0;
y_sq_sum = 0;

for j = 1:12
    x_ages_sum = x_ages_sum + x_ages(j);
    y_BP_sum = y_BP_sum + y_BP(j);
    x_y_sum = x_y_sum + x_y(j);
    x_sq_sum = x_sq_sum + x_sq(j);
    y_sq_sum = y_sq_sum + y_sq(j);
end

r_numerator = (n_women*(x_y_sum)) - (x_ages_sum * y_BP_sum);
r_denominator_1 = (n_women*x_sq_sum) - (x_ages_sum^2);
r_denominator_2 = (n_women*y_sq_sum) - (y_BP_sum^2);
r = r_denominator_1*r_denominator_2;
r = r^0.5;
r = r_numerator / r;
```

```
42
43 fprintf('Correlation coefficient between x and y: %.4f\n', r);
44
45
46 % ==================== OUTPUT =====================
47
48 % Correlation coefficient between x and y: 0.8961
49
50 % =================================================
```

```
% NAME: ADITYA BARMAN
% ROLL: 002320601024
% PROBLEM 8. Correlation with Frequency


clc, clearvars, close all

n = 100;
f_vals = [0 0 0 2 4 4
0 0 1 4 6 5
0 0 5 10 8 1
1 4 9 5 2 0
3 6 6 2 0 0
3 5 4 0 0 0];

% initializing upper and lower bounds for x & y
up_bd_x = [49 59 69 79 89 99];
up_bd_y = [99 89 79 69 59 49];
lw_bd_x = [40 50 60 70 80 90];
lw_bd_y = [90 80 70 60 50 40];

% initialiazing midpts and assumed means (same for x & y)
midpts_x = (up_bd_x + lw_bd_x) / 2;
midpts_y = (up_bd_y + lw_bd_y) / 2;
mean_asmd_xy = 74.5;
% obtaining factor from subtraction from assumed mean
diff_factor = 10;

% calculating u & v vals
u_vals = zeros(1, 6);

for i = 1:6
    u_vals(i) = ((midpts_x(i) - mean_asmd_xy) / diff_factor);
end

v_vals = u_vals(end:-1:1);

% initializing a 6x6 zero matrix to store fuv values
fuv = zeros(6, 6);
% following loop traverses through each cell and stores the required
value
```

```
41 for j = 1:6
42     for k = 1:6
43         fuv(j, k) = f_vals(j, k) * v_vals(j) * u_vals(k);
44     end
45 end
46
47
48 % initializing required matrices
49 % for v
50 f_v = [10 16 24 21 17 12]; % given
51 fv = zeros(1, 6);
52 fv_sq = zeros(1, 6);
53 f_uv = 0;
54
55 %for u
56 f_u = [7 15 25 23 20 10]; % given
57 fu = zeros(1, 6);
58 fu_sq = zeros(1, 6);
59
60 % calculating fu, fv, fu^2, fv^2
61 for a = 1:6
62     fv(a) = f_v(a) .* v_vals(a);
63     fv_sq(a) = f_v(a) .* (v_vals(a)^2);
64     fu(a) = f_u(a) .* u_vals(a);
65     fu_sq(a) = f_u(a) .* (u_vals(a)^2);
66 end
67
68 % calculating f_uv
69 for m = 1:36
70     f_uv = f_uv + fuv(m);
71 end
72 % calculating respective sums
73 fv_sum = 0;
74 fv_sq_sum = 0;
75 fu_sum = 0;
76 fu_sq_sum = 0;
77
78 for d = 1:6
79     fv_sum =fv_sum + fv(d);
80     fv_sq_sum =fv_sq_sum + fv_sq(d);
81     fu_sum =fu_sum + fu(d);
```

```
 82     fu_sq_sum =fu_sq_sum + fu_sq(d);
 83 end
 84
 85 % calculating square of summation of fu & fv respectively
 86 fu_sum_sq = fu_sum ^ 2;
 87 fv_sum_sq = fv_sum ^ 2;
 88
 89 % calculating correlation coefficient between x & y
 90 corr_coeff_num = (n*f_uv) - (fu_sum*fv_sum);
 91 corr_coeff_denom = (sqrt((n*fu_sq_sum)-fu_sum_sq))*(sqrt↙
((n*fv_sq_sum)-fv_sum_sq));
 92 corr_coeff = corr_coeff_num / corr_coeff_denom;
 93
 94 fprintf('Correlation coefficient between the marks in Mathematics and↙
the marks in Physics is: %.4f\n', corr_coeff);
 95
 96 % ====================== OUTPUT ==============================
 97
 98 % Correlation coefficient between the marks in Mathematics and the↙
marks in Physics is: 0.7686
 99
100 % ============================================================
```

```
% NAME: ADITYA BARMAN
% ROLL: 002320601024
% PROBLEM 9. Regression of X on Y (with plot)


clc, clearvars, close all

X = [56 42 72 36 63 47 55 49 38 42 68 60];
Y = [147 125 160 118 149 128 150 145 115 140 152 155];

n = length(Y);
Y_sq = Y .^ 2;
X_sq = X .^ 2;
YX = zeros(1, n);

for i = 1:n
    YX(i) = Y(i) * X(i);
end

Y_sum = 0;
X_sum = 0;
Y_sq_sum = 0;
X_sq_sum = 0;
YX_sum = 0;

for j = 1:n
    Y_sum = Y_sum + Y(j);
    X_sum = X_sum + X(j);
    Y_sq_sum = Y_sq_sum + Y_sq(j);
    X_sq_sum = X_sq_sum + X_sq(j);
    YX_sum = YX_sum + YX(j);
end

a_num = (n * YX_sum) - (Y_sum * X_sum);
a_denom = (n * Y_sq_sum) - (Y_sum ^ 2);

b_num = (X_sum * Y_sq_sum) - (Y_sum * YX_sum);
b_denom = (n * Y_sq_sum) - (Y_sum ^ 2);

a_eqn = a_num / a_denom;
b_eqn = b_num / b_denom;
```

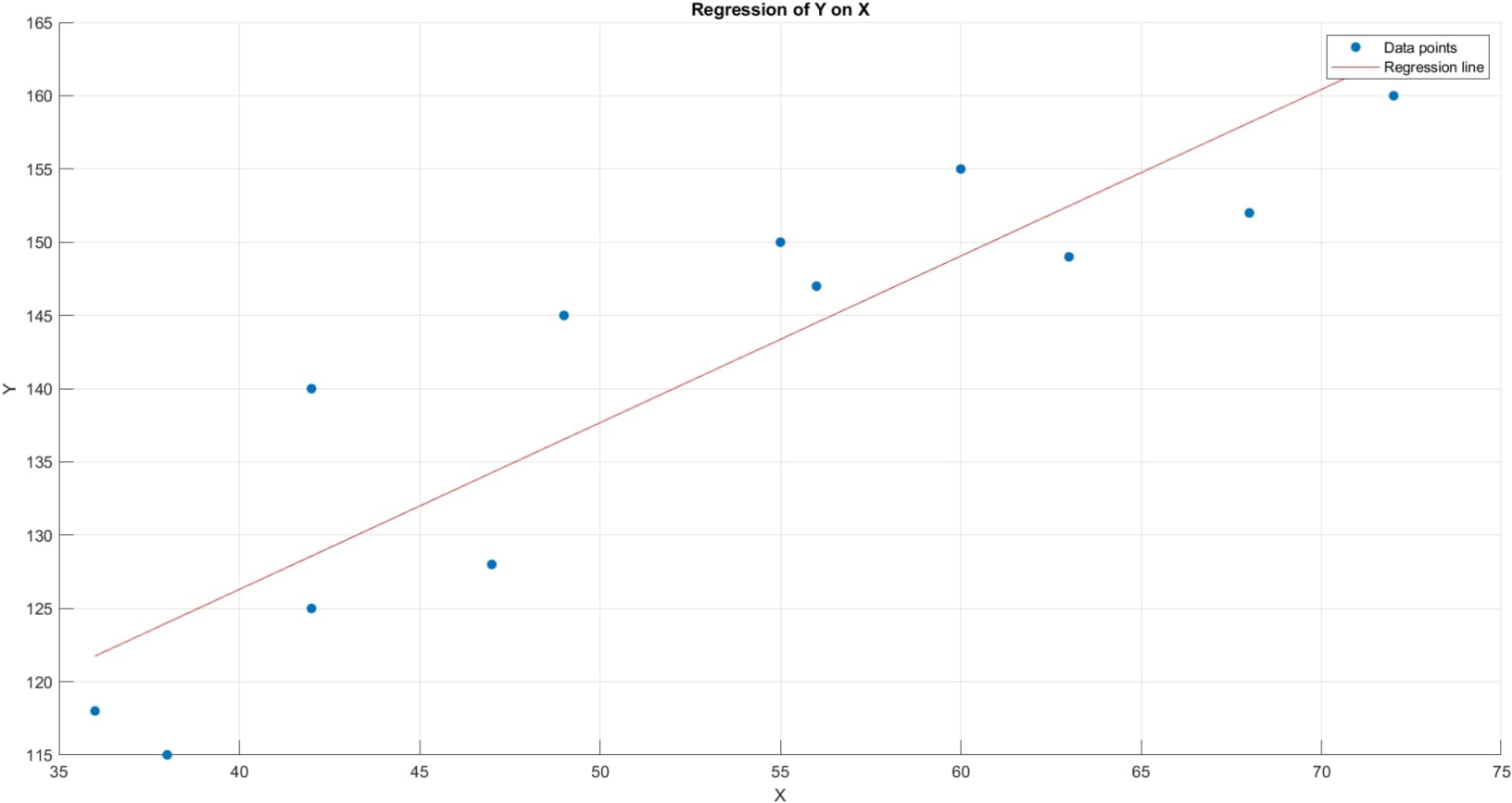
```
42
43 fprintf('The regression equation is X = %.2fY + %.2f\n', a_eqn,↙
b_eqn);
44
45 %
46 % Plotting the data points
47 scatter(Y, X, 'filled');
48 hold on;
49
50 % Plotting the regression line
51 y_line = min(Y):0.01:max(Y);
52 x_line = a_eqn * y_line + b_eqn;
53 plot(y_line, x_line, 'r');
54
55 % Formatting the plot
56 xlabel('Y');
57 ylabel('X');
58 title('Regression of X on Y');
59 legend('Data points', 'Regression line');
60 grid on;
61 hold off;
62
63
64
65 % ================== OUTPUT =====================
66
67 % The regression equation is X = 0.71Y + -46.70
68
69 % ================================================
```

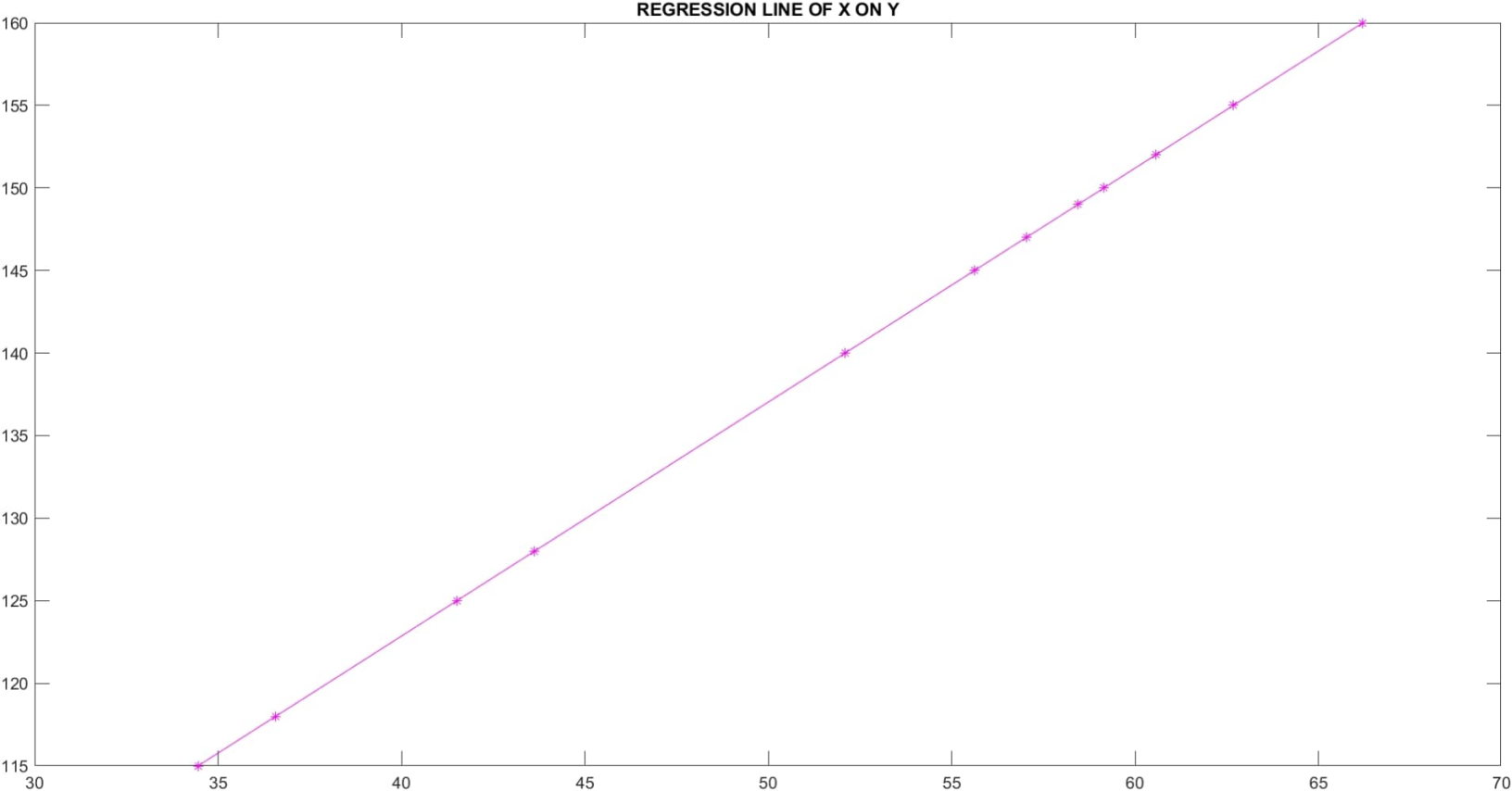
```
% NAME: ADITYA BARMAN
% ROLL: 002320601024
% PROBLEM 9. Regression of X on Y (with plot)


clc, clearvars, close all

x = [56 42 72 36 63 47 55 49 38 42 68 60];
y = [147 125 160 118 149 128 150 145 115 140 152 155];
n = length(x);

sumx = 0;
sumy = 0;

for i = 1:n
    sumx = sumx + x(i);
    sumy = sumy + y(i);
end

sumxx = sum(x .^ 2);
sumyy = sum(y .^ 2);
sumxy = sum(x .* y);
mean_x = sumx / n;
mean_y = sumy / n;
Sx = n * (sumxy) - ((sumx) * (sumy));
Sy = n * (sumyy) - (sumy) ^ 2;
bxy = Sx / Sy;
x = mean_x + bxy * (y - mean_y);

fprintf('Equation of the given regression line of x on y is: \n');
fprintf('x-%f=%f(y-%f) \n',mean_x,bxy,mean_y);
plot(x, y, 'm-*')
title('REGRESSION LINE OF X ON Y')


% ==================== OUTPUT ========================

% Equation of the given regression line of x on y is:
% x-52.333333=0.705678(y-140.333333)

% ====================================================
```

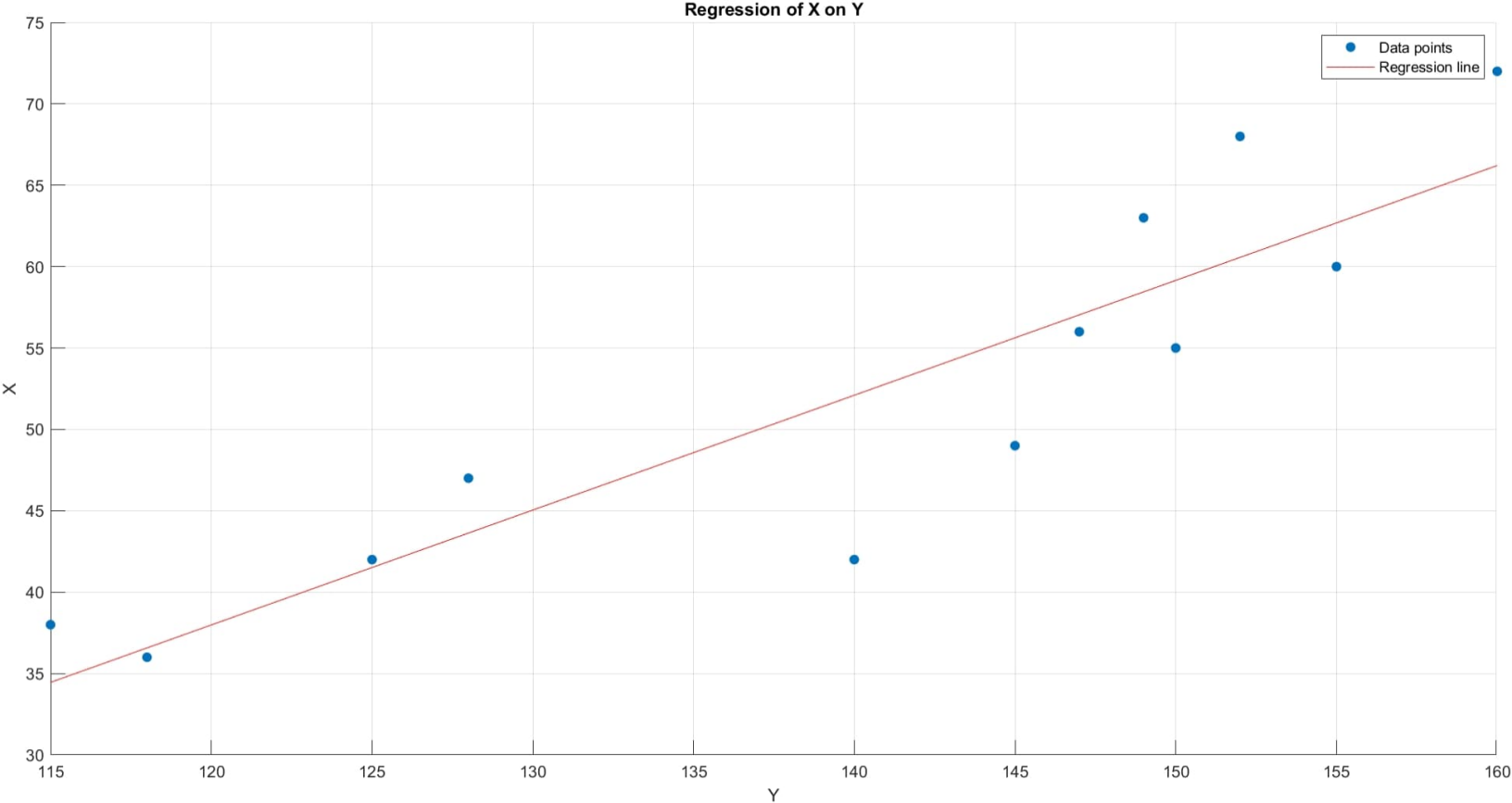
```
% NAME: ADITYA BARMAN
% ROLL: 002320601024
% PROBLEM 10. Regression of Y on X (with plot)


clc, clearvars, close all

X = [56 42 72 36 63 47 55 49 38 42 68 60];
Y = [147 125 160 118 149 128 150 145 115 140 152 155];

n = length(X);
X_sq = X .^ 2;
Y_sq = Y .^ 2;
XY = zeros(1, n);

for i = 1:n
    XY(i) = X(i) * Y(i);
end

X_sum = 0;
Y_sum = 0;
X_sq_sum = 0;
Y_sq_sum = 0;
XY_sum = 0;

for j = 1:n
    X_sum = X_sum + X(j);
    Y_sum = Y_sum + Y(j);
    X_sq_sum = X_sq_sum + X_sq(j);
    Y_sq_sum = Y_sq_sum + Y_sq(j);
    XY_sum = XY_sum + XY(j);
end

a_num = (n * XY_sum) - (X_sum * Y_sum);
a_denom = (n * X_sq_sum) - (X_sum ^ 2);

b_num = (Y_sum * X_sq_sum) - (X_sum * XY_sum);
b_denom = (n * X_sq_sum) - (X_sum ^ 2);

a_eqn = a_num / a_denom;
b_eqn = b_num / b_denom;
```

```
42
43 fprintf('The regression equation is Y = %.2fX + %.2f\n', a_eqn,↙
b_eqn);
44
45 %
46 % Plotting the data points
47 scatter(X, Y, 'filled');
48 hold on;
49
50 % Plotting the regression line
51 x_line = min(X):0.01:max(X);
52 y_line = a_eqn * x_line + b_eqn;
53 plot(x_line, y_line, 'r');
54
55 % Formatting the plot
56 xlabel('X');
57 ylabel('Y');
58 title('Regression of Y on X');
59 legend('Data points', 'Regression line');
60 grid on;
61 hold off;
62
63
64
65 % ==================== OUTPUT =================
66
67 % The regression equation is Y = 1.14X + 80.78
68
69 % ============================================
```

```
% NAME: ADITYA BARMAN
% ROLL: 002320601024
% PROBLEM 10. Regression of Y on X (with plot)


clc, clearvars, close all

x = [56 42 72 36 63 47 55 49 38 42 68 60];
y = [147 125 160 118 149 128 150 145 115 140 152 155];
n = length(x);

sumx = 0;
sumy = 0;

for i = 1:n
    sumx = sumx+x(i);
    sumy = sumy+y(i);
end

sumxx = sum(x .^ 2);
sumyy = sum(y .^ 2);
sumxy = sum(x .* y);
mean_x = sumx / n;
mean_y = sumy / n;
Sx = n * (sumxy) - ((sumx) * (sumy));
Sy = n * (sumxx) - (sumx) ^ 2;
byx = Sx / Sy;
y = mean_y + byx * (x-mean_x);

fprintf('Equation of the given regression line of y on x is: \n');
fprintf('y-%f=%f(x-%f) \n',mean_y,byx,mean_x);
plot(x,y,'m-*')
title('REGRESSION LINE OF Y ON X')


% ======================= OUTPUT ====================

% Equation of the given regression line of y on x is:
% y-140.333333=1.138005(x-52.333333)

% ==================================================
```


Regression of Y on X
Data points
Regression line
Y
X
165
160
155
150
145
140
135
130
125
120
115
35
40
45
50
55
60
65
70
75


REGRESSION LINE OF X ON Y
160
155
150
145
140
135
130
125
120
115
30
35
40
45
50
55
60
65
70


Regression of X on Y
Data points
Regression line
X
Y
75
70
65
60
55
50
45
40
35
30
115
120
125
130
135
140
145
150
155
160

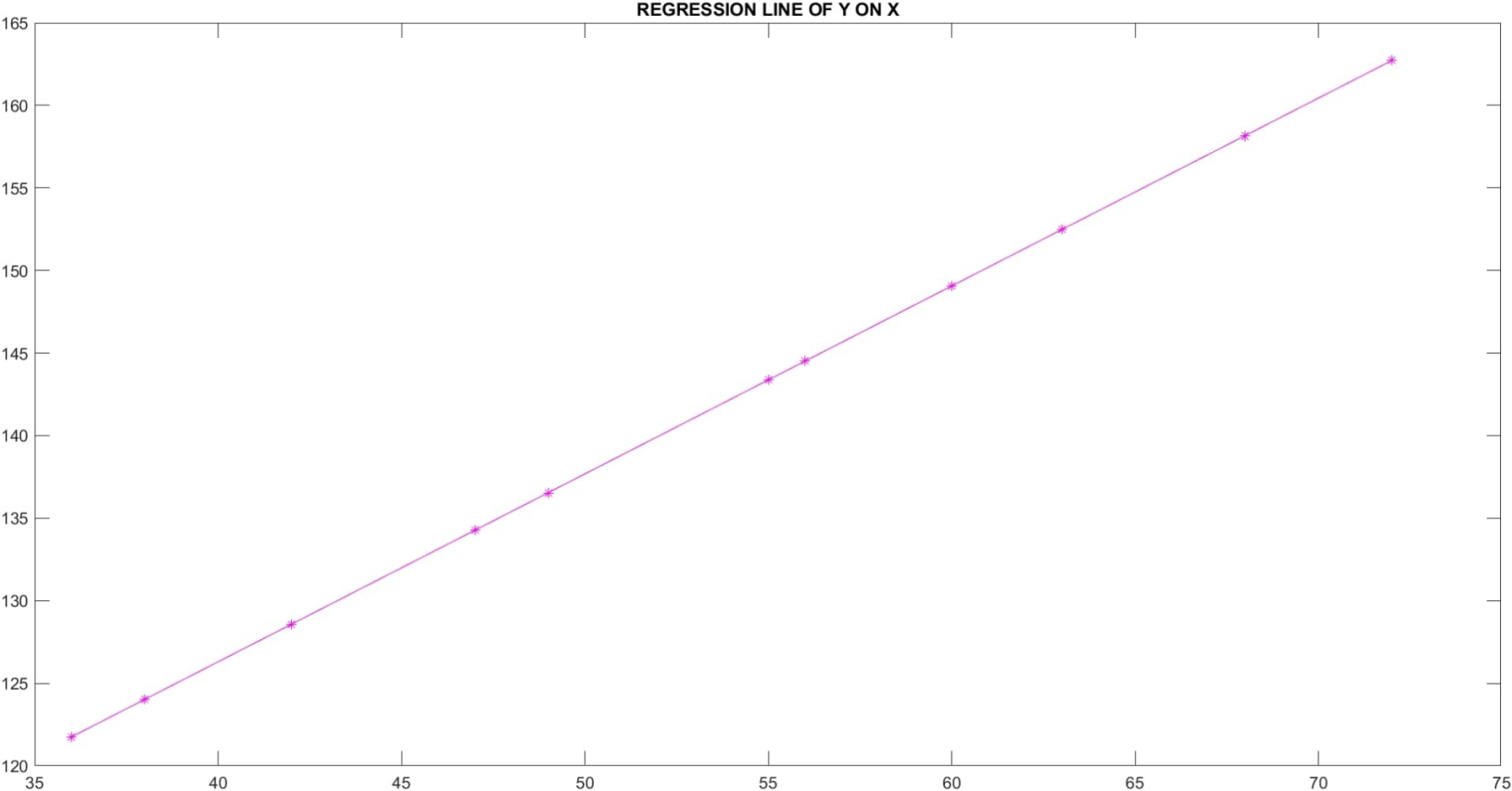

REGRESSION LINE OF Y ON X
165
160
155
150
145
140
135
130
125
120
35
40
45
50
55
60
65
70
75

Figure 1

File Edit View Insert Tools Desktop Window Help

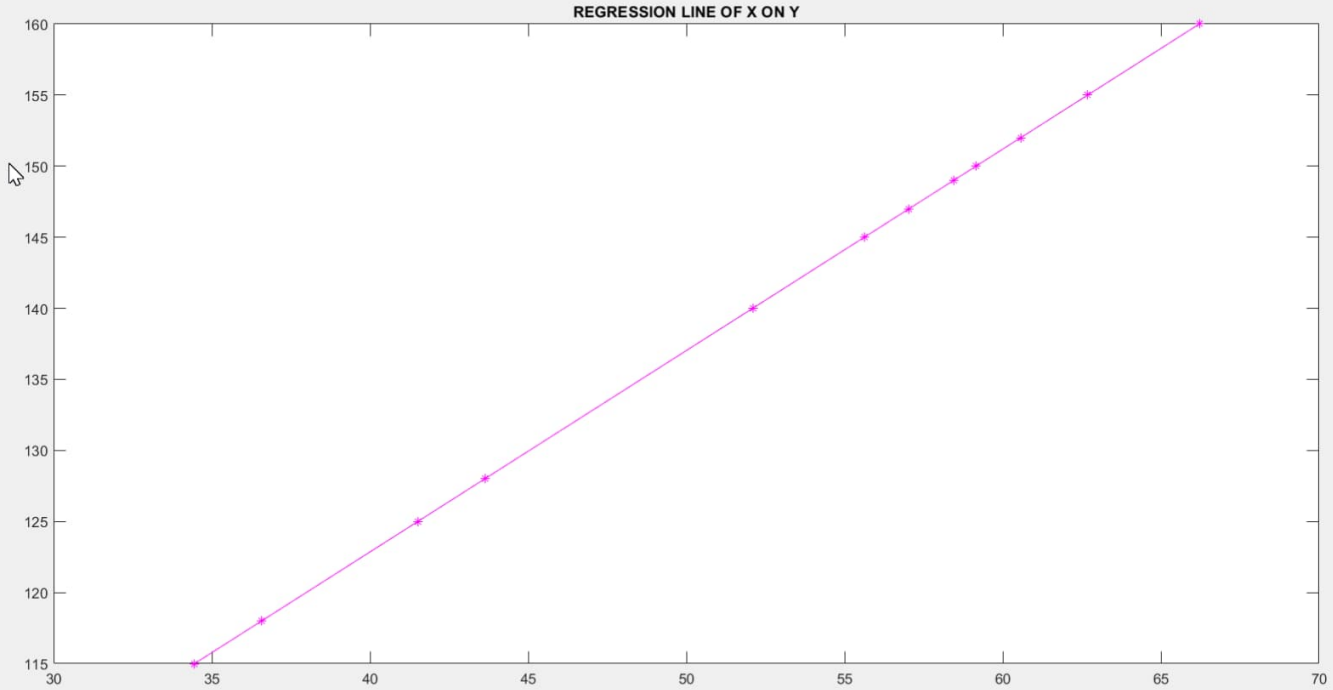


Figure 1

File Edit View Insert Tools Desktop Window Help

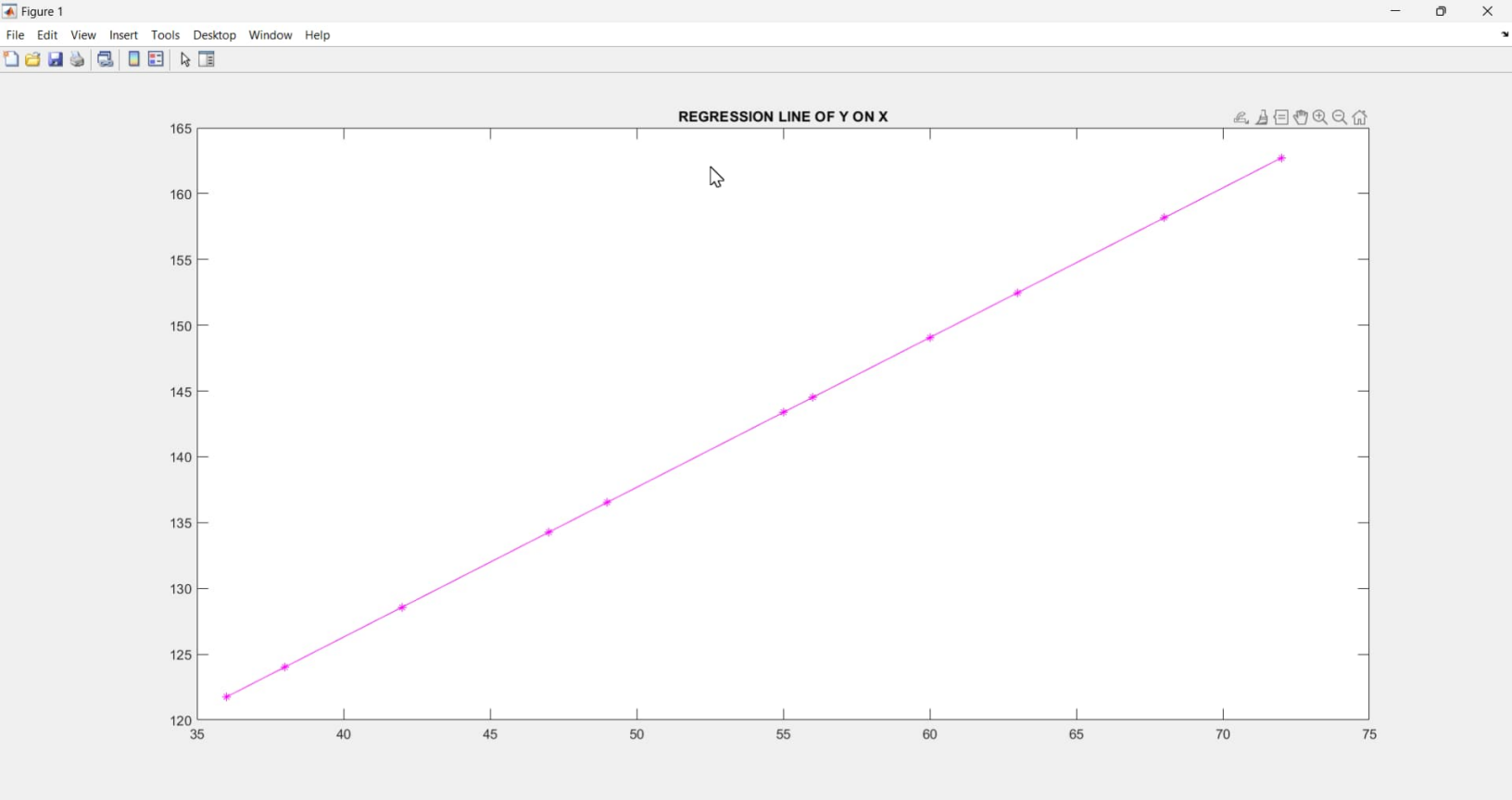


Figure 1

File Edit View Insert Tools Desktop Window Help

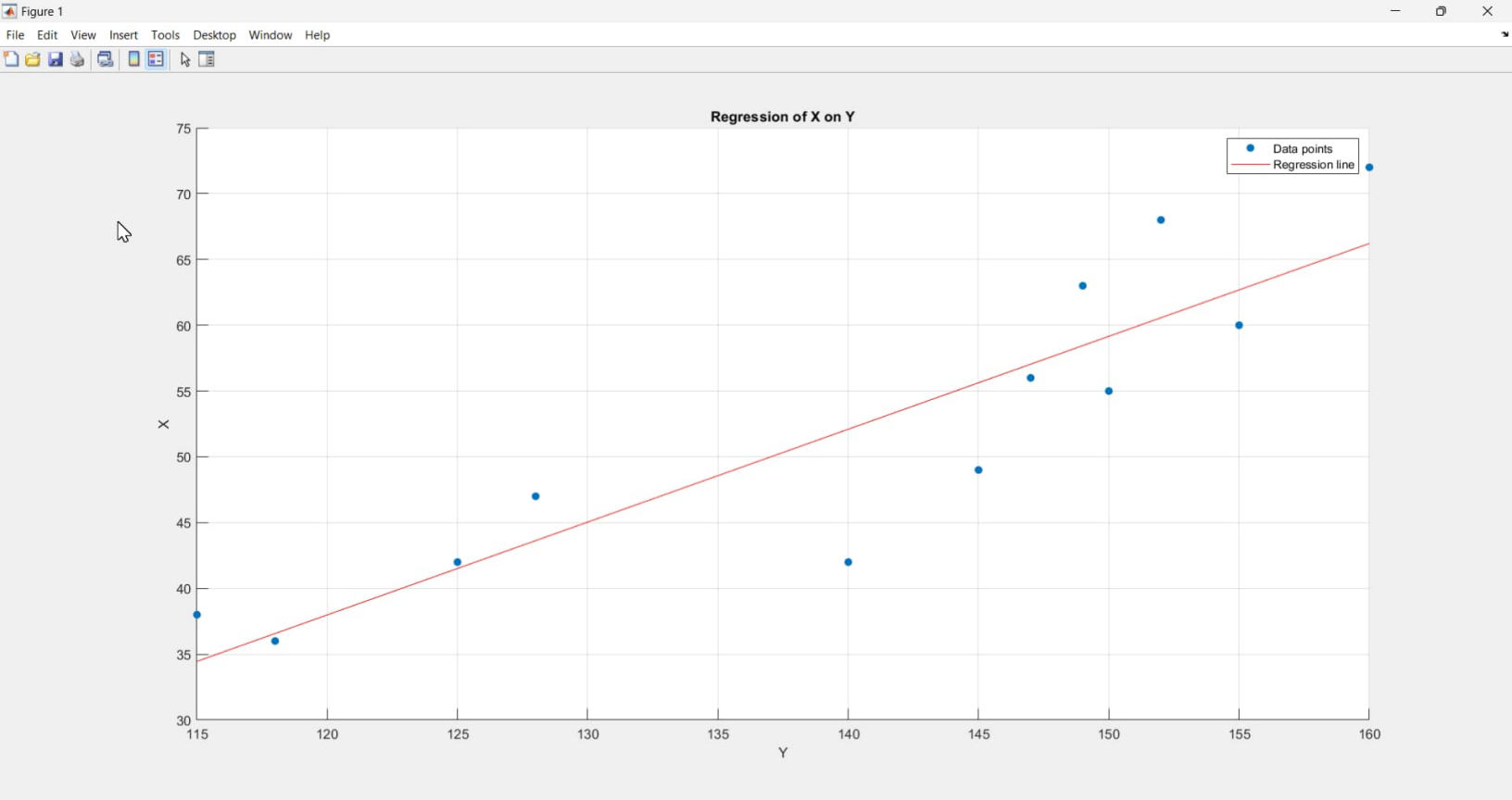
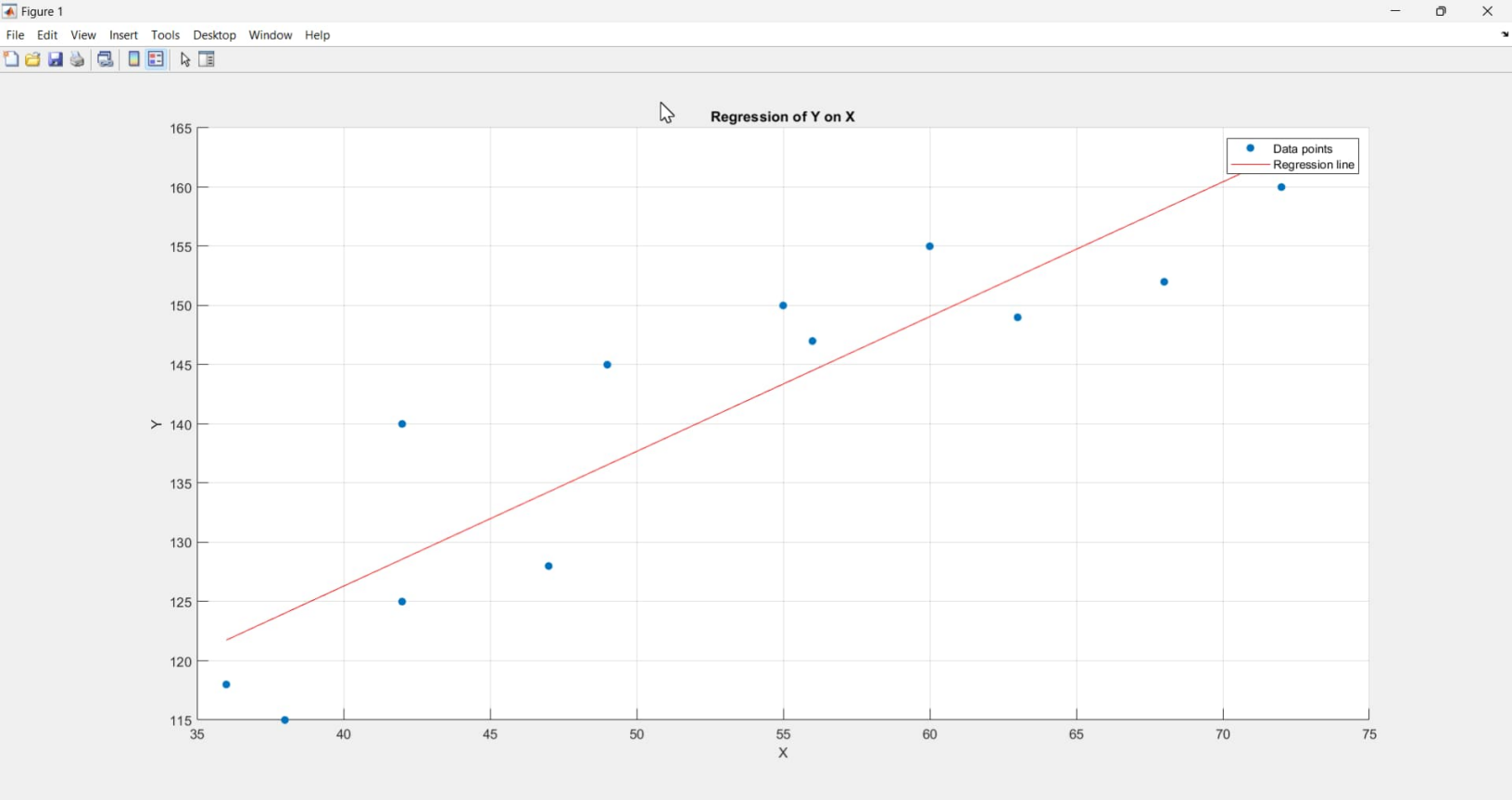


Figure 1

File Edit View Insert Tools Desktop Window Help



```
% NAME: ADITYA BARMAN
% ROLL: 002320601024
% PROBLEM 11. Spearman's Rank Correlation


clc, clearvars, close all

math_x = [43 77 64 96 48 35 86 71];
phys_y = [36 68 49 79 50 41 82 65];
math_x_cp = math_x;
phys_y_cp = phys_y;
n = length(math_x);

R_x = zeros(1, n);
R_y = zeros(1, n);

for i = 1:n
    [valx, idx] = max(math_x);
    math_x(idx) = -Inf;
    R_x(idx) = i;

    [valy, idx] = max(phys_y);
    phys_y(idx) = -Inf;
    R_y(idx) = i;
end

d_sq = (R_x - R_y) .^ 2;
d_sq_sum = sum(d_sq);

sp_num = 6 * d_sq_sum;
sp_denom = n * ((n ^ 2) - 1);

sp = 1 - (sp_num / sp_denom);
table_t = zeros(8,5);
table_t(1:8, 1) = math_x_cp;
table_t(1:8, 2) = phys_y_cp;
table_t(1:8, 3) = R_x;
table_t(1:8, 4) = R_y;
table_t(1:8, 5) = d_sq;
disp(table_t)
fprintf('The Spearman Rank Correlation is %.4f\n', sp);
```

```
42
43
44
45 % ================== OUTPUT =================
46
47 %    43    36     7     8     1
48 %    77    68     3     3     0
49 %    64    49     5     6     1
50 %    96    79     1     2     1
51 %    48    50     6     5     1
52 %    35    41     8     7     1
53 %    86    82     2     1     1
54 %    71    65     4     4     0
55
56 % The Spearman Rank Correlation is 0.9286
57
58 % ===========================================
59
```

```
% NAME: ADITYA BARMAN
% ROLL: 002320601024
% PROBLEM 12. Spearman's Rank Correlation with Perfect agreement


clc, clearvars, close all

math_x = [43 77 64 96 48 35 86 71];
math_x_cp = math_x;
stat_y = [41 68 50 82 49 36 79 65];
stat_y_cp = stat_y;
n = length(math_x);

R_x = zeros(1, n);
R_y = zeros(1, n);

for i = 1:n
    [valx, idx] = max(math_x);
    math_x(idx) = -Inf;
    R_x(idx) = i;

    [valy, idx] = max(stat_y);
    stat_y(idx) = -Inf;
    R_y(idx) = i;
end

d_sq = (R_x - R_y) .^ 2;
d_sq_sum = sum(d_sq);

sp_num = 6 * d_sq_sum;
sp_denom = n * ((n ^ 2) - 1);

sp = 1 - (sp_num / sp_denom);

table_t = zeros(8,5);
table_t(1:8, 1) = math_x_cp;
table_t(1:8, 2) = stat_y_cp;
table_t(1:8, 3) = R_x;
table_t(1:8, 4) = R_y;
table_t(1:8, 5) = d_sq;
disp(table_t)
```

```
fprintf('The Spearman Rank Correlation is %.4f\n', sp);



% ================ OUTPUT ================

%    43    41     7     7     0
%    77    68     3     3     0
%    64    50     5     5     0
%    96    82     1     1     0
%    48    49     6     6     0
%    35    36     8     8     0
%    86    79     2     2     0
%    71    65     4     4     0

% The Spearman Rank Correlation is 1.0000


% ========================================

```

```
% NAME: ADITYA BARMAN
% ROLL: 002320601024
% PROBLEM 13. Spearman's Rank Correlation with Perfect disagreement


clc, clearvars, close all

math_x = [43 77 64 96 48 35 86 71];
beng_y = [79 49 65 36 68 82 41 50];
math_x_cp = math_x;
beng_y_cp = beng_y;
n = length(math_x);

R_x = zeros(1, n);
R_y = zeros(1, n);

for i = 1:n
    [valx, idx] = max(math_x);
    math_x(idx) = -Inf;
    R_x(idx) = i;

    [valy, idx] = max(beng_y);
    beng_y(idx) = -Inf;
    R_y(idx) = i;
end

d_sq = (R_x - R_y) .^ 2;
d_sq_sum = sum(d_sq);

sp_num = 6 * d_sq_sum;
sp_denom = n * ((n ^ 2) - 1);

sp = 1 - (sp_num / sp_denom);
table_t = zeros(8,5);
table_t(1:8, 1) = math_x_cp;
table_t(1:8, 2) = beng_y_cp;
table_t(1:8, 3) = R_x;
table_t(1:8, 4) = R_y;
table_t(1:8, 5) = d_sq;
disp(table_t)
fprintf('The Spearman Rank Correlation is %.4f\n', sp);
```

```
42
43
44
45 % ================= OUTPUT =================
46
47 %    43    79     7     2    25
48 %    77    49     3     6     9
49 %    64    65     5     4     1
50 %    96    36     1     8    49
51 %    48    68     6     3     9
52 %    35    82     8     1    49
53 %    86    41     2     7    25
54 %    71    50     4     5     1
55
56 % The Spearman Rank Correlation is -1.0000
57
58
59 % ==========================================
60
```