Q1

```
Please enter the first mean:>? .
Invalid input. Returning default value: 0
Please enter the first variance:>? .
Invalid input. Returning default value: 1
Please enter the first number of observations:>? .
Invalid input. Returning default value: 1000
Please enter the second mean:>? .
Invalid input. Returning default value: 5
Please enter the second variance:>? .
Invalid input. Returning default value: 2
Please enter the second number of observations:>? .
Invalid input. Returning default value: 1000
First three values of x: [1.42774827 2.77864056 1.915085  ]
First three values of y: [5.64585152 3.9528988  5.06553622]
```

Q2

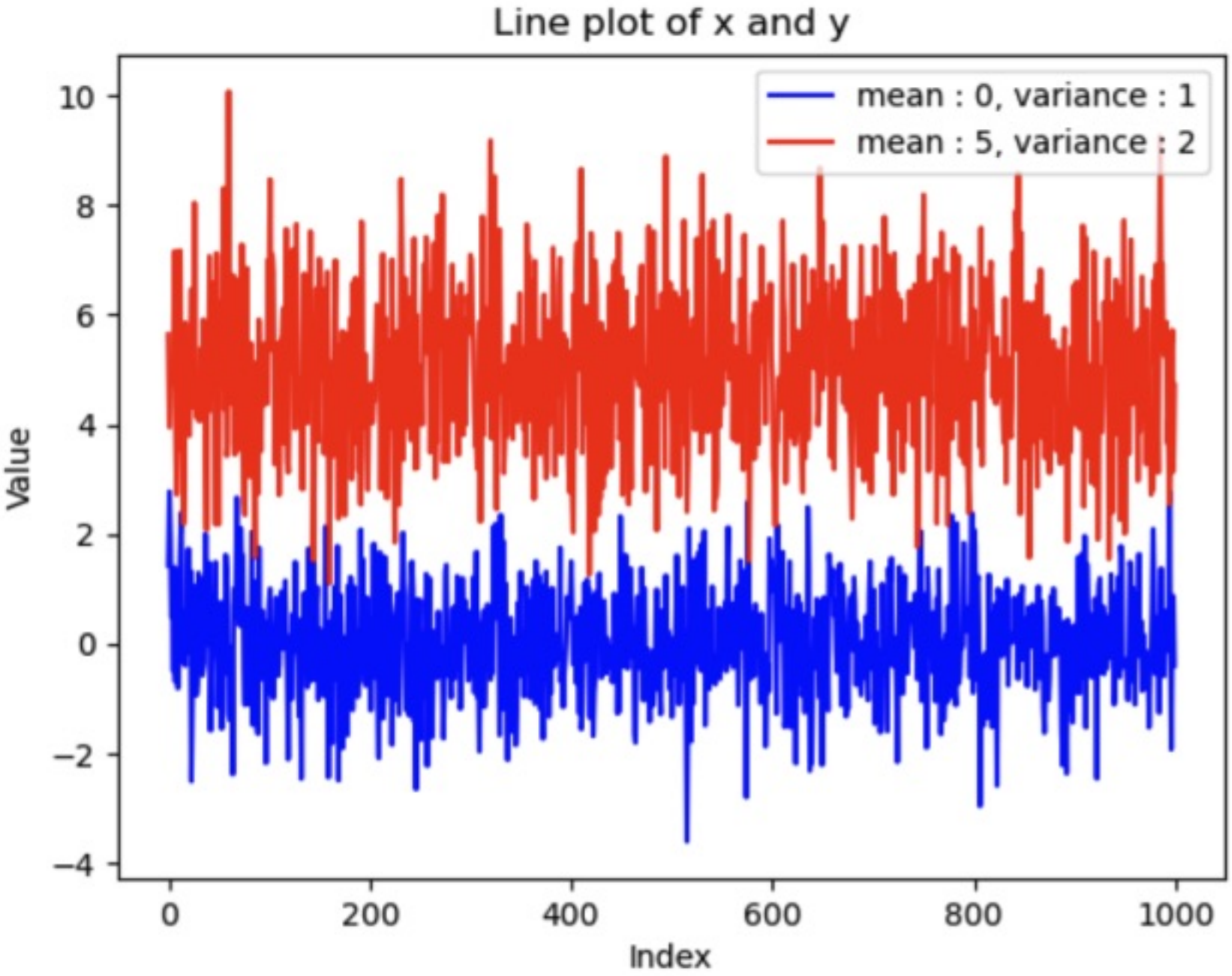
```
The Pearson's correlation coefficient: -0.016980032549015 12
```

→ The value is around 0 which suggests that there is no linear relationship between two normally distributed random variables, x(mean: 0, variance: 1) and y(mean: 5, variance: 2).

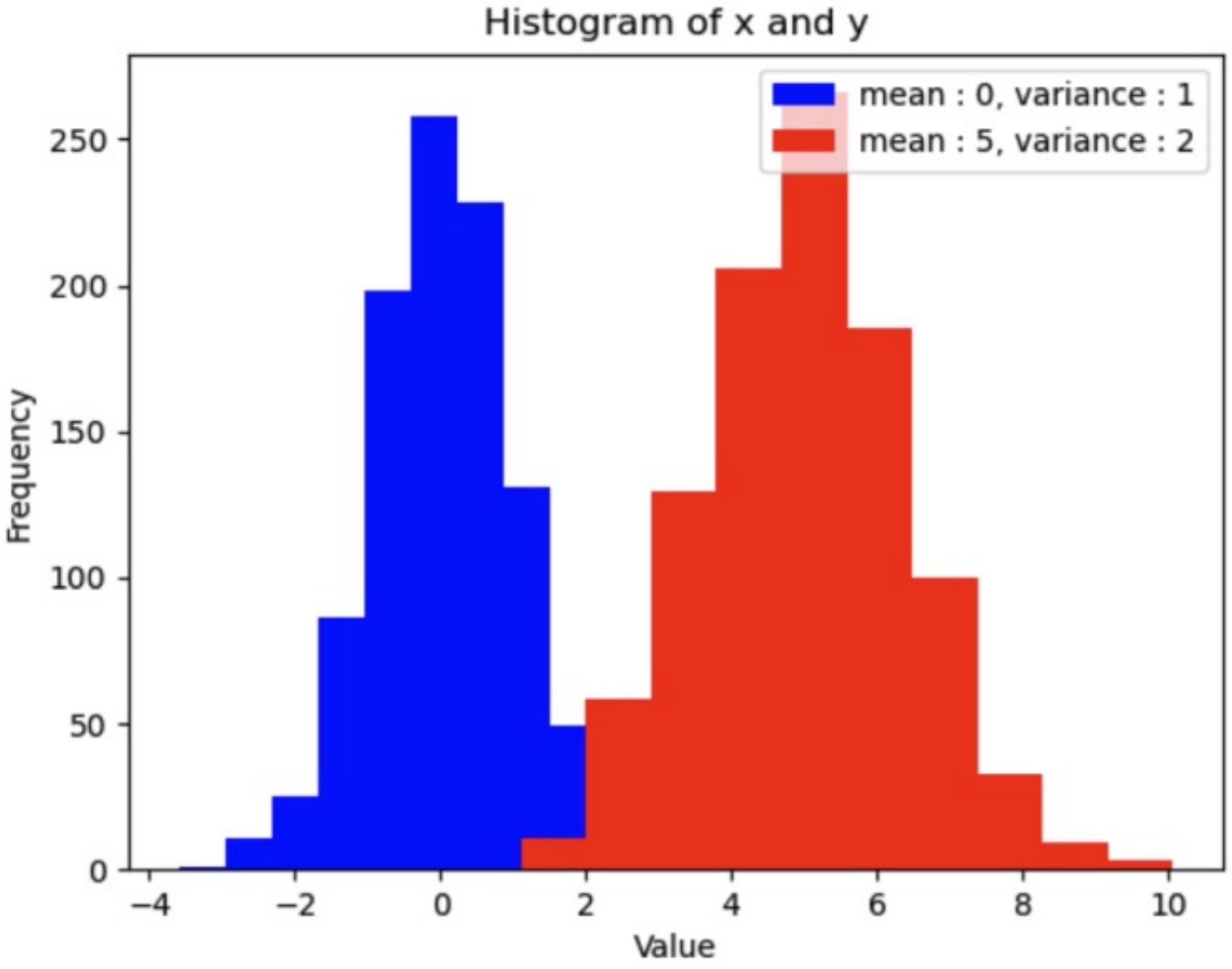
Q3

```
The sample mean of random variable x is : 0.04249670487561396
The sample mean of random variable y is : 4.998471521676516
The sample variance of random variable x is : 0.9344820559844909
The sample variance of random variable y is : 1.9458752455012174
```

Q4


Line plot of x and y
mean : 0, variance : 1
mean : 5, variance : 2
Value
Index
10
8
6
4
2
0
−2
−4
0
200
400
600
800
1000

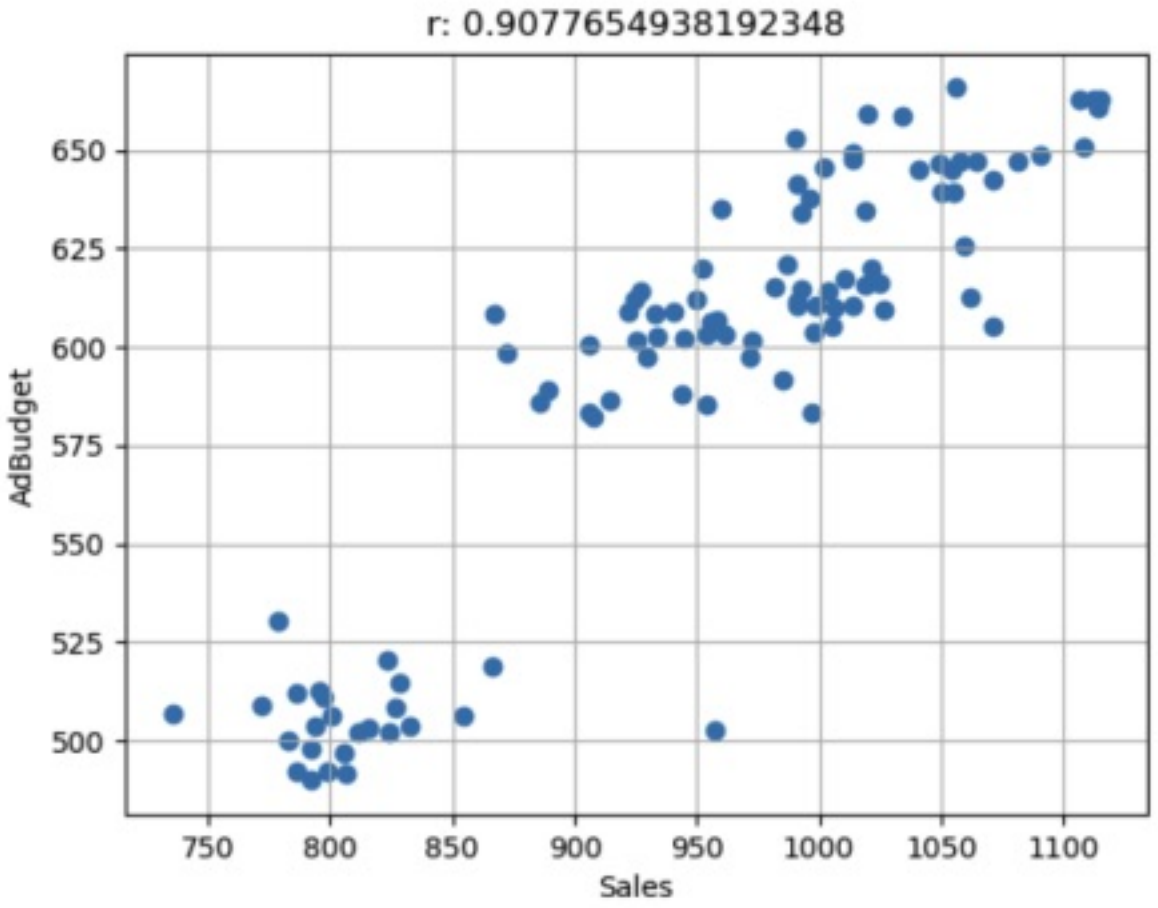
Q5


Histogram of x and y
mean : 0, variance : 1
mean : 5, variance : 2
Frequency
Value
0
50
100
150
200
250
−4
−2
0
2
4
6
8
10

Q7

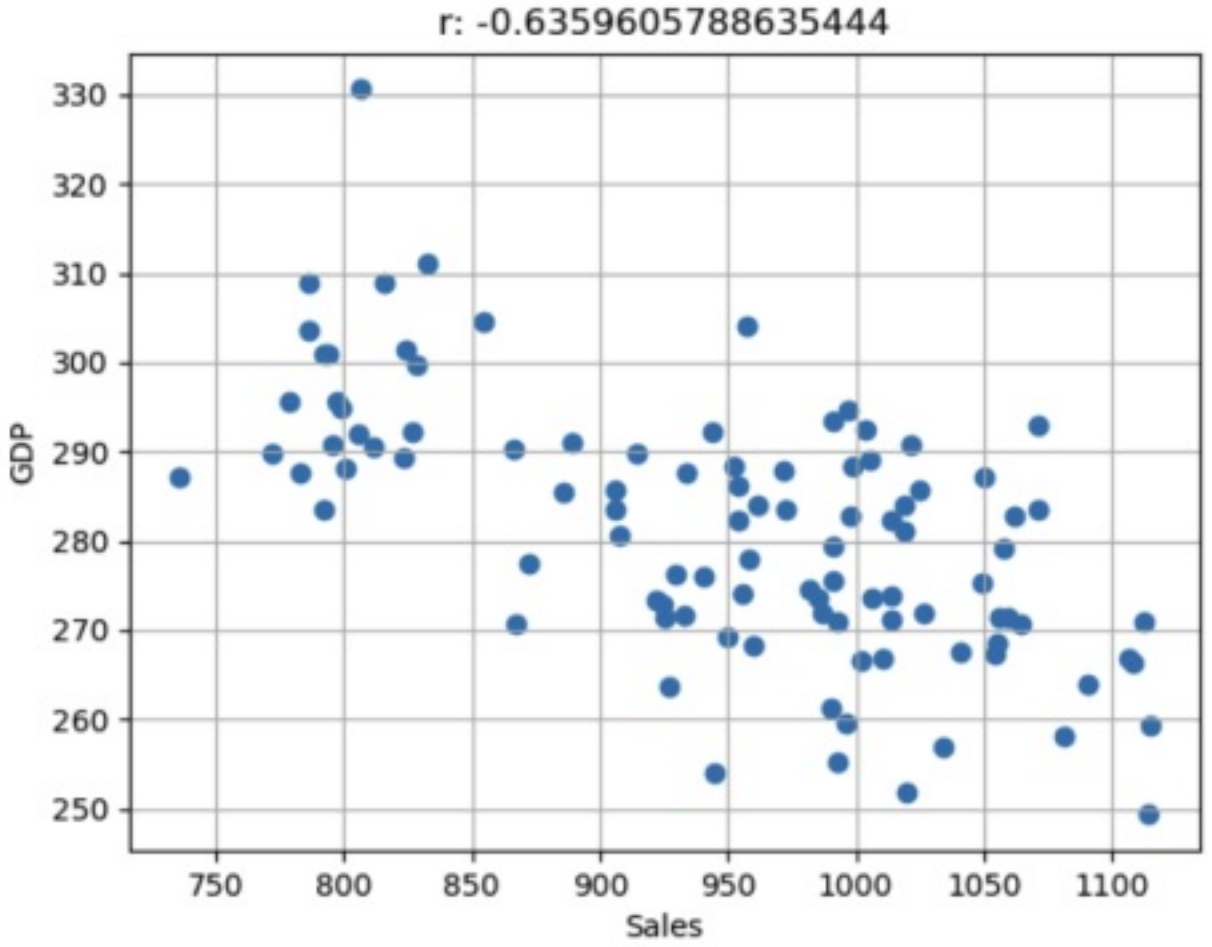
```
The sample Pearson’s correlation coefficient between Sales & AdBudget is: 0.9077654938192348
The sample Pearson’s correlation coefficient between Sales & GDP is: -0.6359605788635873
The sample Pearson’s correlation coefficient between AdBudget & GDP is: -0.76885965174274
```

Q8



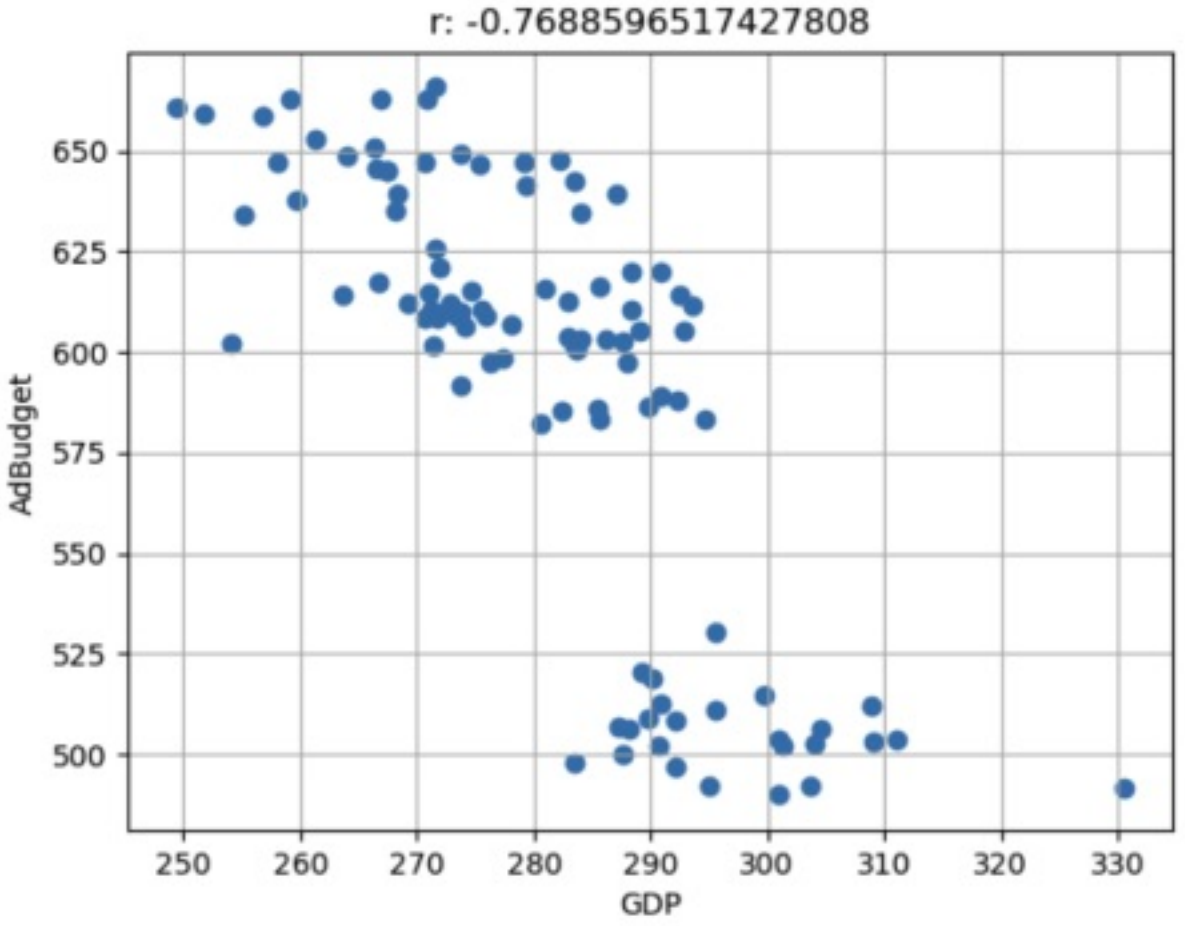
→ Since the scatter plot shows that the data points are close to the line y = x, this indicates that as the AdBudget increases, Sales increase proportionally. This strong linear relationship is reflected by the high Pearson correlation coefficient, close to 1

Q9



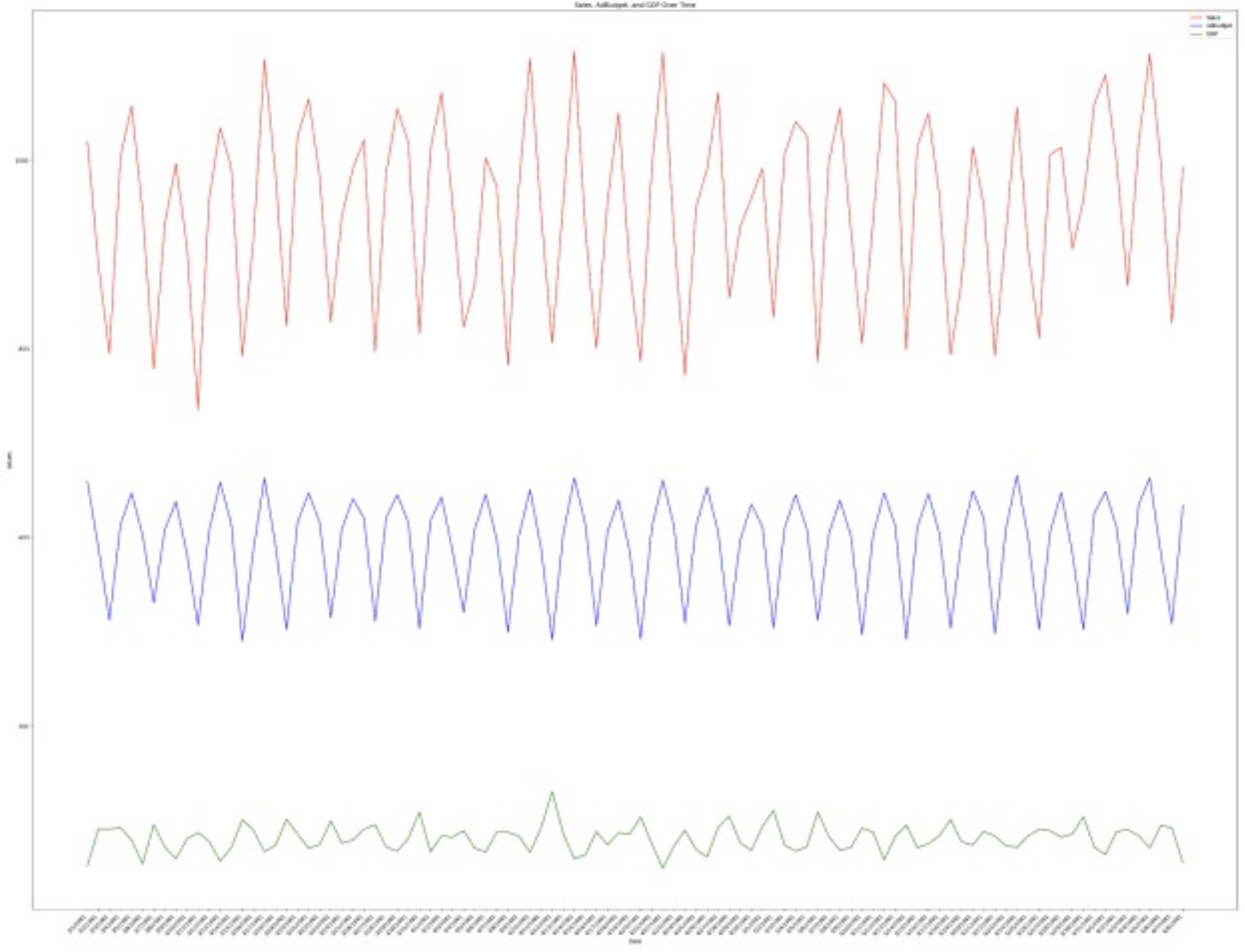
→ Since the scatter plot shows that the data points are close to the line y = -x, this indicates that as the GDP increases, Sales decrease proportionally. This relationship is reflected by the Pearson correlation coefficient, close to -1

Q10

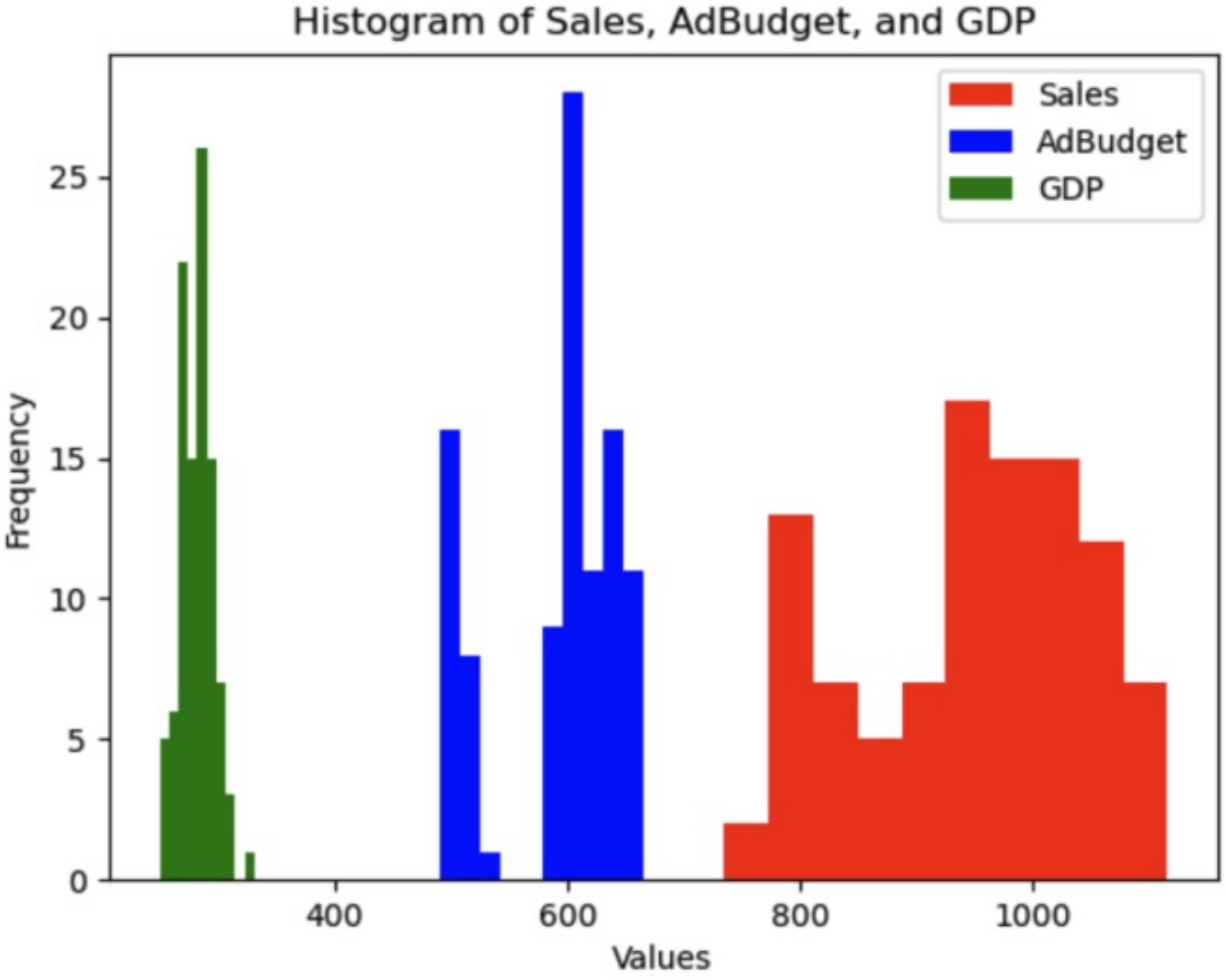


→ This scatter plot also shows that the data points are close to the line y = -x, which indicates that as the AdBudget increases, GDP decrease proportionally. This relationship is reflected by the Pearson correlation coefficient, close to -1

Q11



Q12


Histogram of Sales, AdBudget, and GDP
Sales
AdBudget
GDP
Frequency
0
5
10
15
20
25
400
600
800
1000
Values