PRACTICAL WORK

2. **Management of a soft-drink bottling company wants to develop a method for allocating delivery costs of customers. Although one cost clearly relates to travel time within a particular route, another variable cost reflects the time required to unload the cases of soft drink at the delivery point. A sample of 10 deliveries within a territory was selected. The delivery times and the number of cases delivery were recorded as follows.**

Customer	Number of Cases	Delivery Time(minutes)
1	52	32.1
2	64	34.8
3	95	37.8
4	116	38.5
5	143	44.2
6	161	43.0
7	184	49.4
8	218	56.8
9	254	61.2
10	267	58.2

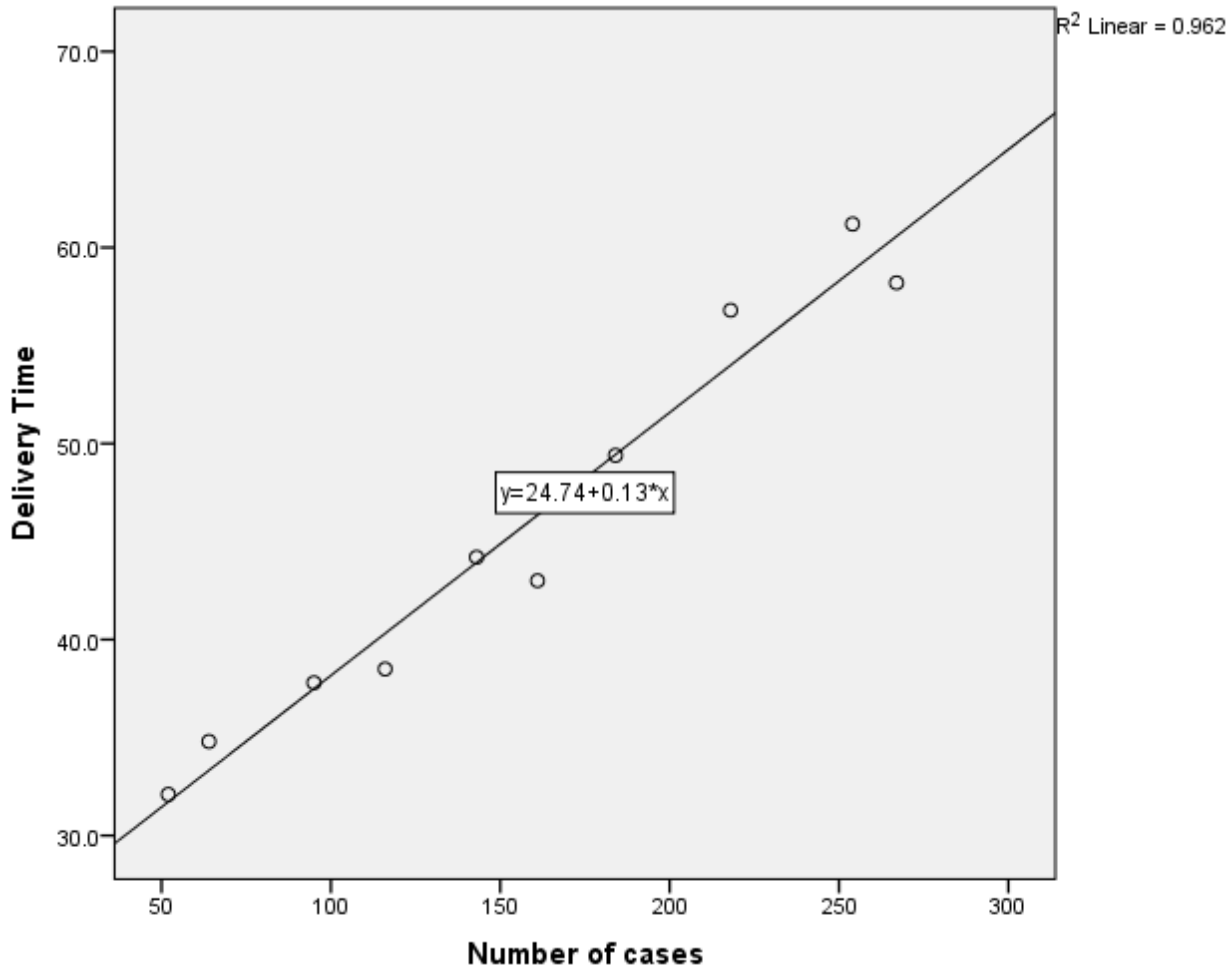
a. Find the correlation between delivery times and the number of cases delivered.

Correlations

		Number of Cases	Delivery Time
Number of Cases	Pearson Correlation	1	.981**
	Sig. (2-tailed)		.000
	N	10	10
Delivery Time	Pearson Correlation	.981**	1
	Sig. (2-tailed)	.000	
	N	10	10

**. Correlation is significant at the 0.01 level (2-tailed).

b. Develop a regression model to predict delivery time, bases on the number of cases delivered.



c. Interpret the meaning of the slope in this problem.

Here we have regression equation,

Y = 24.74 + 0.13 * X

So the value of Y increases if value of X increases and the slope is linear.

d. Predict the delivery time for 150 cases.

Here, we have

Y = 24.74 + 0.13 * X

= 24.74 + 0.13 * 150

= 44.24

Therefore, the delivery time for 150 cases of soft drink is 44.24 min.

e. Compute the standard error of the estimate and interpret its meaning.

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Delivery Time[b]	.	Enter

a. Dependent Variable: Number of Cases

b. All requested variables entered.

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	49417.318	1	49417.318	205.149	.000[b]
	Residual	1927.082	8	240.885		
	Total	51344.400	9			

a. Dependent Variable: Number of Cases

b. Predictors: (Constant), Delivery Time

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-171.620	23.353		-7.349	.000
	Delivery Time	7.171	.501	.981	14.323	.000

a. Dependent Variable: Number of Cases

The Standard error is 23.353. The average deviation of observation of dependent variable from fitted regression line is 23.353.

f. Determine the coefficient of determination and explain its meaning in this

problem.

Solution:

The coefficient of determination is 0.962.Hence 96.2% of variation has been explained by the independent variable and rest is due to unit factor.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.981[a]	.962	.958	15.520

a. Predictors: (Constant), Delivery Time

g. Compute residual for customer 7.

Solution:

Here, we have

Y = 24.74 + 0.13 * X

When X= 7

Y = 24.72 + 0.13 * 7

= 25.63

Then , Residual error = 49.4 – 25.63

= 23.77

PRACTICAL WORK

1. **OmPrakash Sharma, owner of the Kathmandu Precast Company, has hired you as a part time analyst. He was extremely pleased when you uncovered a positive relationship between the number of building permits and the amount of the work available in the company. Now he wonders if it's possible to use knowledge of interest rates in first mortgages to predict the number of building permits that will be issued each month .You collect a simple of data covering nine months.**

Months	Building Permits(Y)	Interest Rate(X)
1	786	10.2%
2	494	12.6
3	289	13.5
4	892	9.7
5	343	10.8
6	888	9.5
7	509	10.9
8	987	9.2
9	187	14.2

a. Calculate the correlation coefficient between building permits and interest rate and test its significance at 1%.

```
 CORRELATIONS
/VARIABLES=Y X
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Correlations

		building permit	Interest Rate
building permit	Pearson Correlation	1	.317
	Sig. (2-tailed)		.406
	N	9	9
Interest Rate	Pearson Correlation	.317	1
	Sig. (2-tailed)	.406	
	N	9	9

b. Estimate the best fitting regression line and compute residual for month 9.

Solution:

The best fitting regression line is:

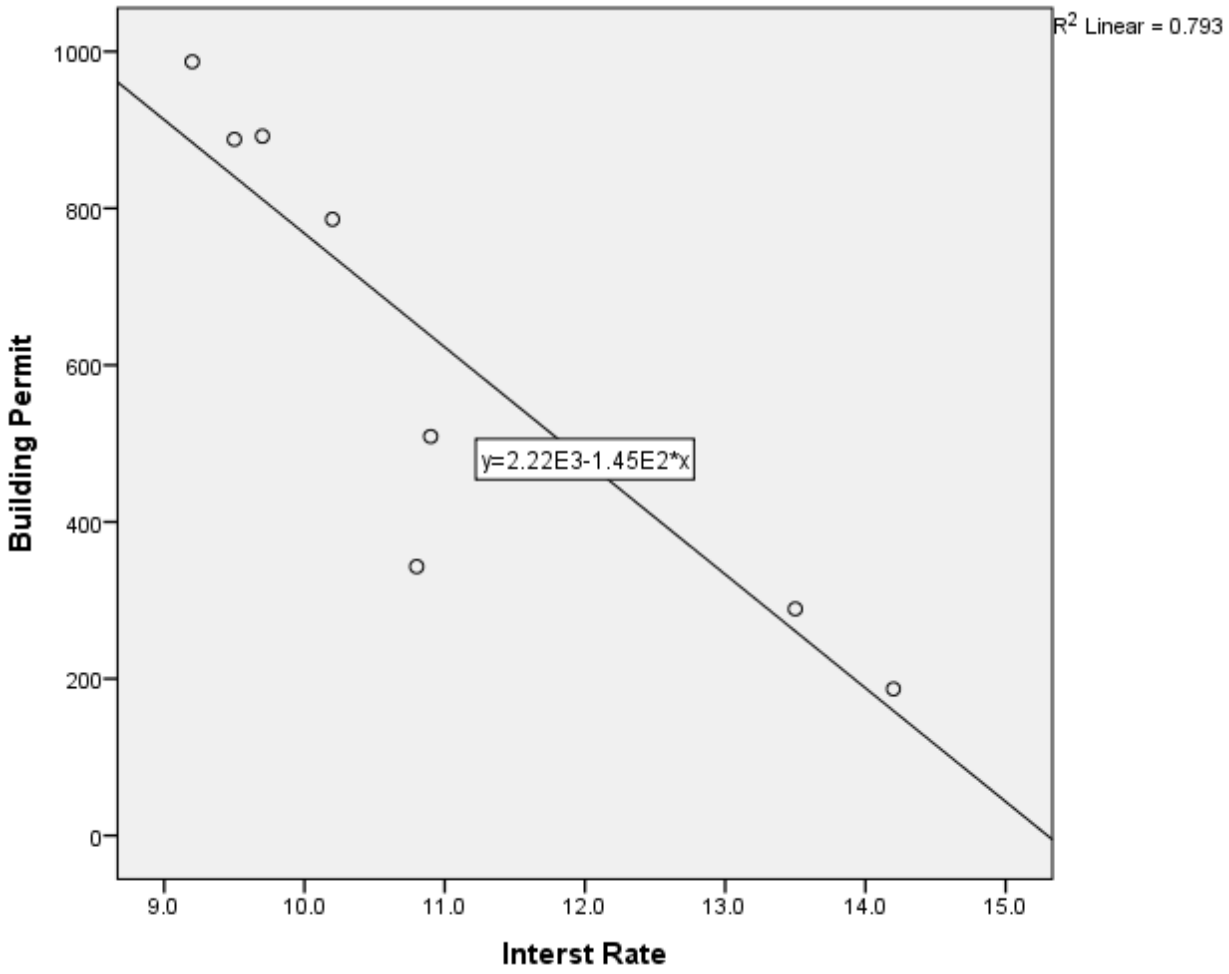
Y = 2.22E3 – 1.45E2 * X

Also,

For residual error,

X = 9; Y = 2.22E3 – 1.45E2 * 9 = **813.5**

Residual error = 892 – 813.5 = **77.5**



c. Compute the coefficient of determination and interpret its meaning.

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Building Permit[b]	.	Enter

a. Dependent Variable: Interst Rate

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.891[a]	.793	.764	.8867

a. Predictors: (Constant), Building Permit

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	21.132	1	21.132	26.876	.001[b]
	Residual	5.504	7	.786		
	Total	26.636	8			

a. Dependent Variable: Interst Rate

b. Predictors: (Constant), Building Permit

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	14.447	.696		20.745	.000
	Building Permit	-.005	.001	-.891	-5.184	.001

a. Dependent Variable: Interst Rate

The coefficient of determination (r^2) = 0.793.
Hence 79.3% of variation has been explained by the independent variable and rest is due to unit factor.

d. Predict building permits when the interest rate increases by 9.7%.

Since , we know

```
Y = 2.22E3 - 1.45E2 * X
So when X = 9.7,
      Y     = 2.22E3 - 1.45E2 * 9.7
            = 813.5
```

PRACTICAL WORK

Calculate Karl Pearson's correlation coefficient test its significance and find the limits of population correlation coefficient. Find coefficient of determination.

NUTRITION	CHILD MORTALITY
12.1	9.5
9.1	9.2
26.0	11.8
6.4	6.4
9.5	7.3
18.5	20.3
22.8	24.4
17.4	21.1
13.9	10.7
3.2	3.5
30.2	11.8
15.7	12.3
8.7	11.8
5.6	9.4
11.2	8.3
9.8	9.0
8.4	4.7

Solution

Correlations

Correlations

		Nutrition	Child Mortality
Nutrition	Pearson Correlation	1	.626**
	Sig. (2-tailed)		.007
	N	17	17
Child Mortality	Pearson Correlation	.626**	1
	Sig. (2-tailed)	.007	
	N	17	17

**. Correlation is significant at the 0.01 level (2-tailed).

Regression

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Child Mortality[b]	.	Enter

a. Dependent Variable: Nutrition

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.626[a]	.391	.351	6.0127

a. Predictors: (Constant), Child Mortality

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	348.761	1	348.761	9.647	.007[b]
	Residual	542.280	15	36.152		
	Total	891.041	16			

a. Dependent Variable: Nutrition

b. Predictors: (Constant), Child Mortality

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.222	3.307		1.277	.221
	Child Mortality	.818	.263	.626	3.106	.007

a. Dependent Variable: Nutrition

Therefore, coefficient of determination is 0.391 and correlation is 0.626.