LEARNING EXCEL : DATA ANALYSIS

An Internship Project Report Submitted in Partial fulfillment of the requirements for the award of Degree of Bachelor of Science in Mathematics

Submitted by

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(Autonomous)

(Affiliated to Bharathiar University,Coimbatore)

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This is to certify that the internship project work entitled **"LEARNING EXCEL: DATA ANALYSIS"** is a bonafied record done by **A.PAVITHRADEVI (18BM7462)** submitted in partial fulfillment of the requirement for the award of the degree of Bachelor of Science in Mathematics at Sri G.V.G Visalakshi college for women (Autonomous),Udumalpet during the academic year 2018-2021.

Signature of the HOD **Signature of the staff-in-charge**

Introduction

The internship training program was organized by “Skill India- eskillIndia E-learning aggregator from NSDC (National Skill Development Corporation). This is one of the E-Learning Content. This E skill India include many Knowledge Partners. One of the Knowledge Partner “LinkedIn” gave this Course. Author **Curt Frye** teaches about the foundation concepts including basic calculations such as mean, median, mode, variance and standard deviation and also provides how to calculate the covariance and correlation and utilize data distributions.

Digital Tools

Dr. Curt Frye gave training under the title LEARNING EXCEL : DATA ANALYSIS

1. Introduction about the power data analysis of using excel
2. To calculate mean, median and mode
3. To measure maximum and minimum
4. To find the Error and Squared error from the mean value
5. Analyze data using variance and standard deviation
6. Use of Normal distribution
7. Use of Poisson distribution
8. Use of Exponential distribution
9. To Measure Covariance
10. To Measure Correlation

Tools used for Learning Excel: Data Analysis

Introduction about the power of data analysis of using excel

- Returns the correct results about 85% of the time.
- Time saving
- Gather and organize the data effectively.
- Create formulas in excel.
- Create charts.

To calculate Mean, Median and Mode

- Mean formula
    1. =average(a2:a12)
    2. Where, a2:a12 is the column A entered data
    3. Finally, click on enter to get the Mean value from the column A from a2 to a12.
- Median formula
    1. =median(a2:a12)
    2. Where, a2:a12 is the column A entered data.
    3. Finally, click on enter to get the Median value from the column A from a2 to a12.
- Mode formula
    1. =mode.sngl(a2:a12)

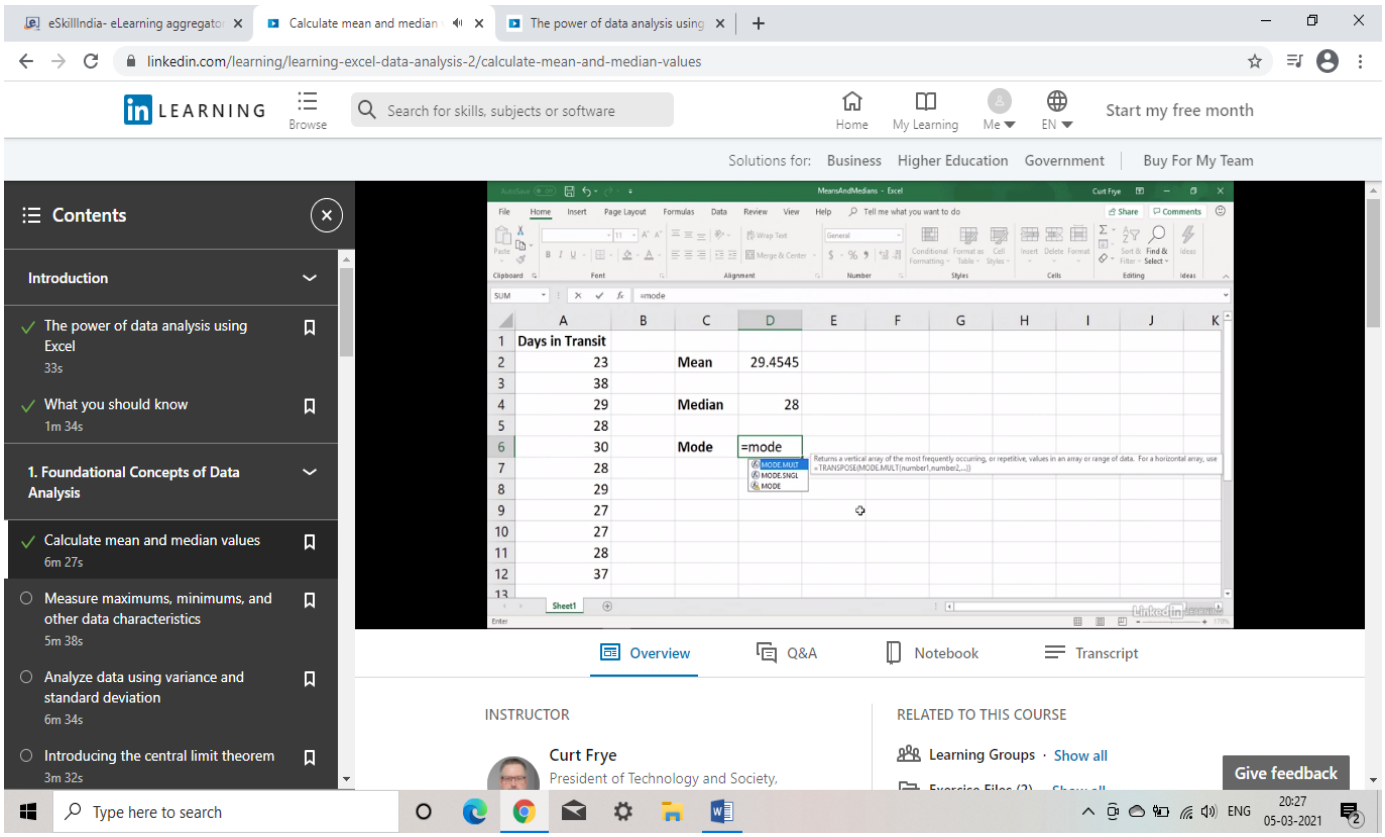
       Where, a2:a12 is the column A entered datas

       Click enter to get mode.sngl value.
    2. =mode.mult

       Where, a2:a12 is the column A entered datas

       Click ctrl+shift+enter to get mode.mult value.

Calculation of mean, median and mode:



To measure maximum and minimum

- Minimum formula

1. =min(a2:a41)
2. Where, a2:a41 is the column A entered datas.
3. Finally, click on ctrl+shift+↓ to get all the values in column A.
4. Then, click on enter to get the minimum value from the column A from a2 to a41.

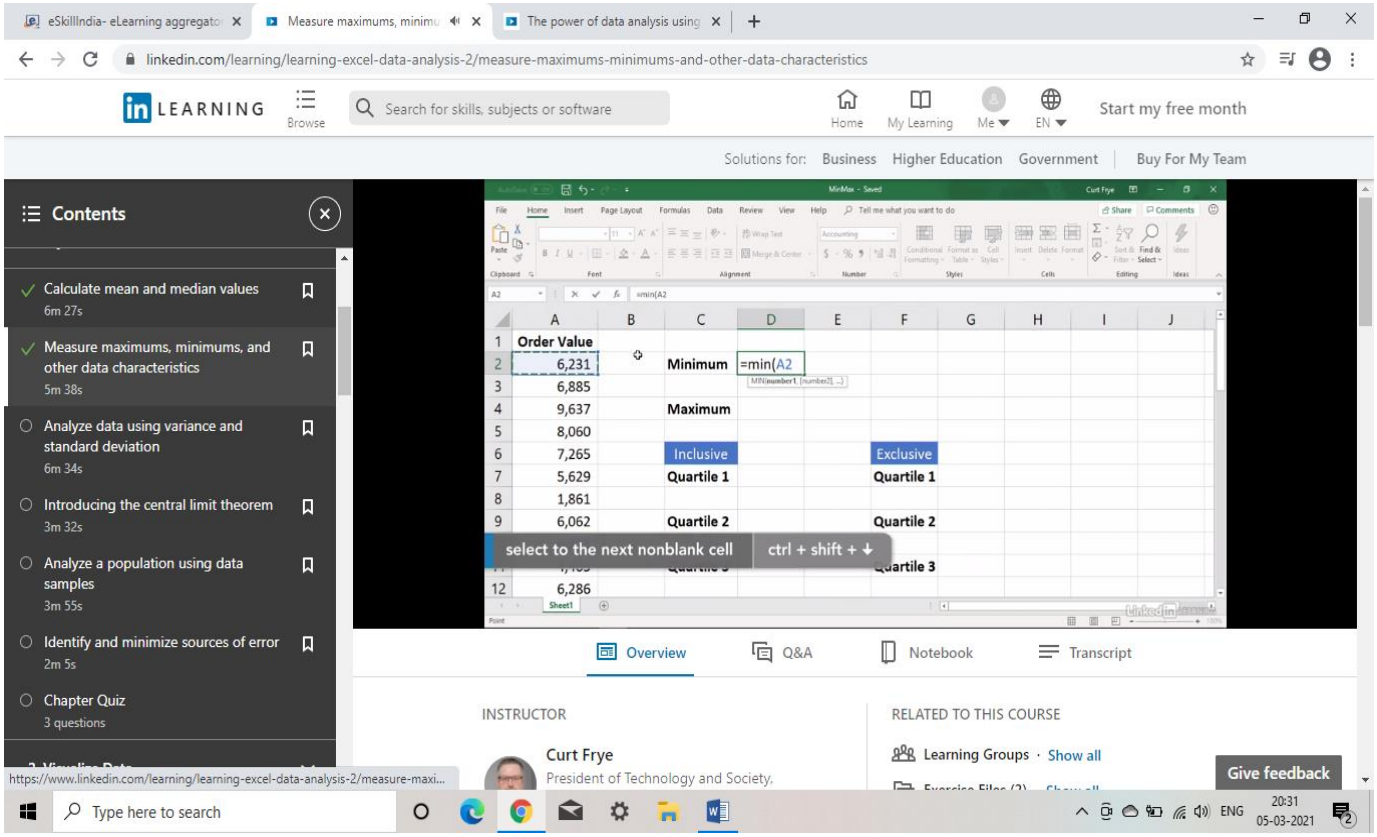
❖ Maximum formula

1. =average(a2:a41)
2. Where, a2:a41 is the column A entered datas
3. Finally, click on ctrl+shift+↓ to get all the values in column A.
4. Then, click on enter to get the minimum value from the column A from a2 to a41.

❖ **Inclusive and exclusive values**

Inclusive formula End with .inc

Exclusive formula end with .exc



To find the Error and Squared errors from the Mean value

➢ Error finding:

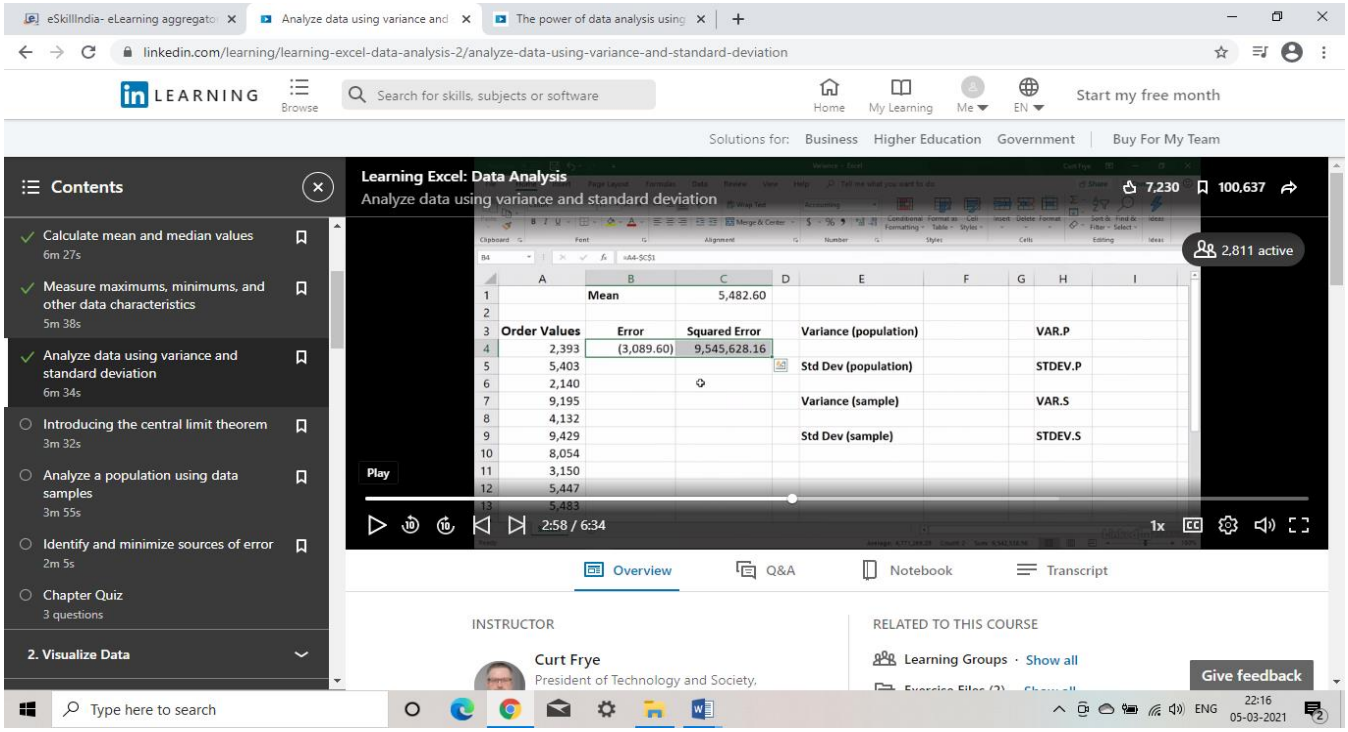
- Error for b4
- Formula: =a4-c1 and click enter.
- Where, c1 is the entered mean value

  (here the mean value taken as 5,482.60)
- Finally we get the “b4” error value for the order value 2,393 as 3,089.60

➢ Squared errors:

- Squared Error for “b4” is
- Formula : =b4^2 and click enter.
- Finally, the squared error is given as 9,545,628.16

Calculation of Error and Squared error:



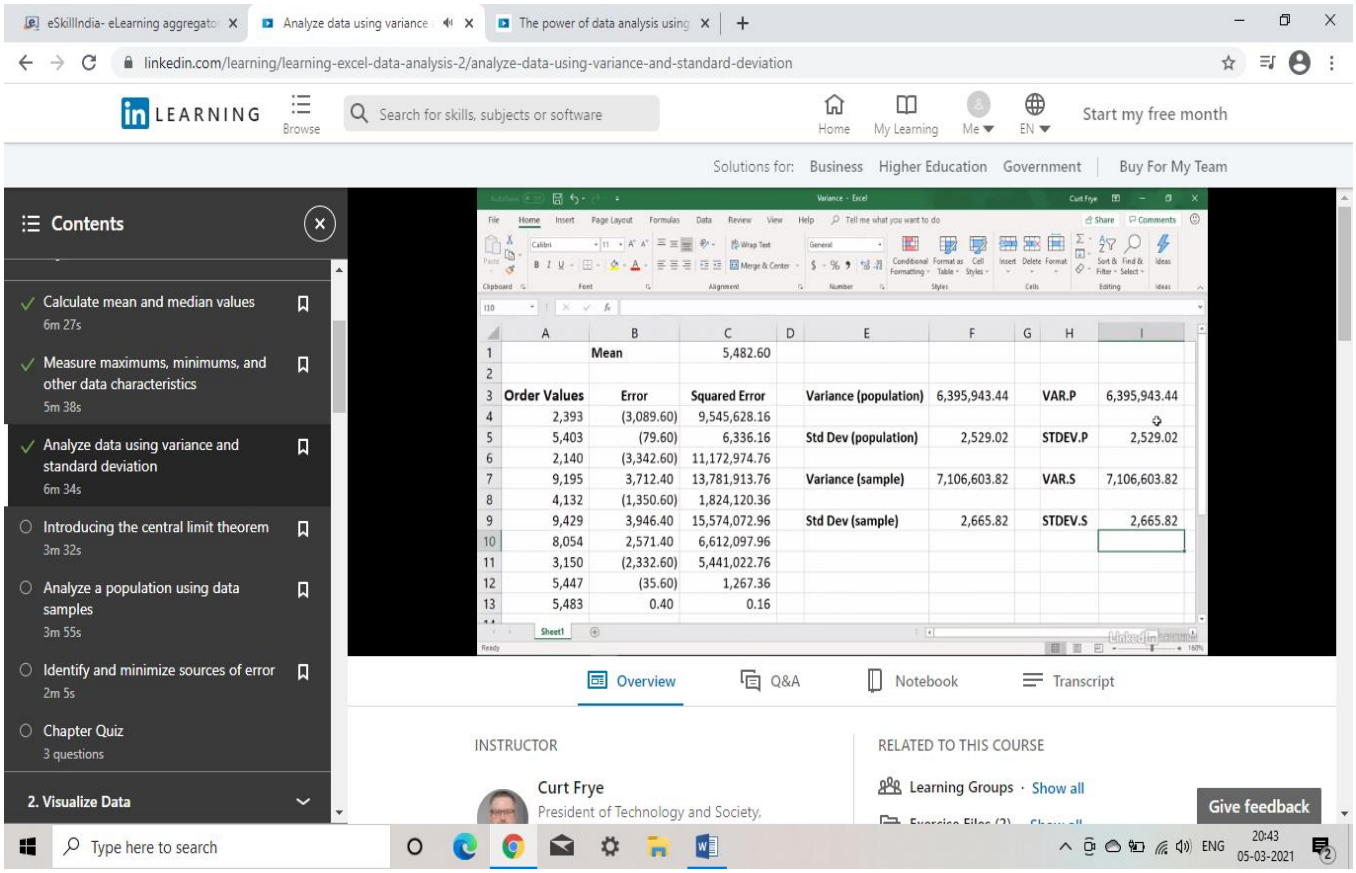
Analyze data using variance and standard deviation

Variance:

- Variance population Formula: =average(c4:c13)
- Click enter to get variance in f3 from c4 to c13 (we calculate for squared errors values) we get 6,393,943.44
- And to use formula: =var.p(a4:a14) taken from order values we get as 6,393,943.44
- Thus, we get the result as the variation is as same as taken from squared error and order values

Standard deviation:

- Standard deviation Formula: =sqrt(f3)
- Click enter to get standard deviation in f5 from squaring f3 (we calculate from squared values) we get as 2,529.02
- And to use formula: =stdev.p(a4:a14) taken from order values we get as 2,529.02
- Thus, we get the result as the standard deviation is as same as taken from squared error and order values



- To calculate **variance sample** use formula: =sum(c4:c13)/(count(c4:c13)-1
- This value changes from variance (variance population) because of -1
- We get same ans using =var.s(a4:a13) click enter.
- To calculate **standard deviation** sample use formula: =sqrt(f3) and same value using formula as =stdev.s(a4:a13)
- Click enter.

Data Distributions

- **Use of Normal distribution:**

NORM.DIST function

Syntax:

NORM.DIST(x, mean, standard_ dev, cumulative)

The NORM.DIST function syntax has the following arguments:

- **X** - the value for which you want the distribution.
- **Mean** - the arithmetic mean of the distribution.
- **Standard_dev** - the standard deviation of the distribution.
- **Cumulative** Required. A logical value that determines the form of the function. If cumulative is TRUE, NORM.DIST returns the cumulative distribution function; if FALSE, it returns the probability density function.

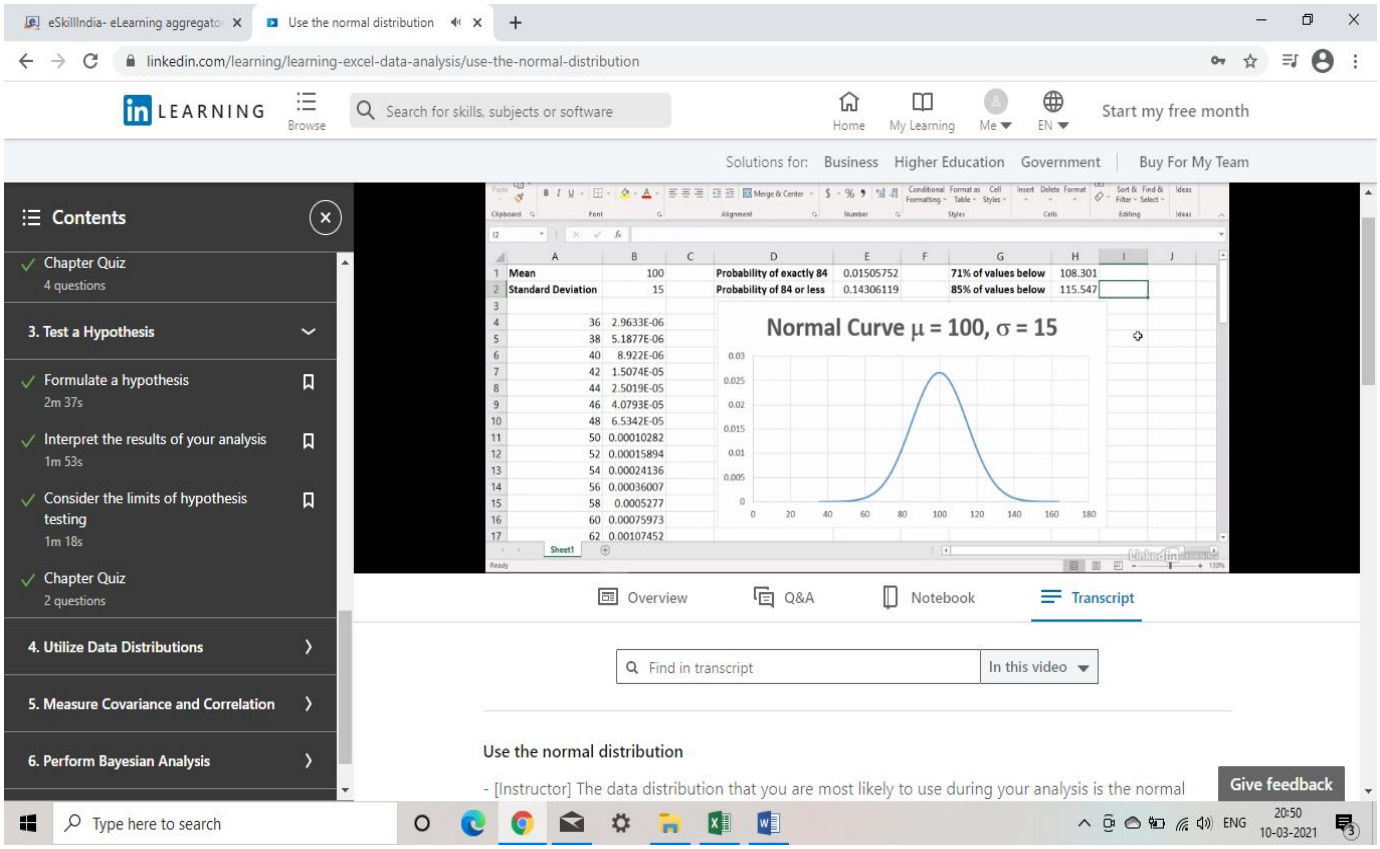
Remarks:

- If mean or standard_dev is non-numeric, NORM.DIST returns the #VALUE! error value.
- If standard_dev ≤ 0, NORM.DIST returns the #NUM! error value.
- If mean = 0, standard_dev = 1, and cumulative = TRUE, NORM.DIST returns the standard normal distribution, NORM.S.DIST.
- The equation for the normal density function (cumulative = FALSE) is:

$$f(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{\frac{-(x-\mu)^2}{2\sigma^2}}$$

- When cumulative = TRUE, the formula is the integral from negative infinity to x of the given formula.

Normal distribution:



- The normal distribution is defined by two values. The first is the mean(average) and the second is the standard deviation. The standard deviation is the amount of spread in your data.

Procedure:

- To create calculations for a variety of values. And those will appear in the chart that you see on the worksheet. Starting in cell B4, we calculate the probability of the value 36. So, in cell B4, =NORM.DIST. This takes a look at the probability of a specific value occurring within the normal distribution.
- This function requires four arguments. The first is the value in cell A4, as 36 and then a comma. The next is the mean, and in cell B1 then a comma. The standard deviation is in B2.And finally indicate whether the cumulative distribution function, that is, any value up

to, and including a specific value X. Or whether the point probability using the probability mass function. That is, the probability that a specific value will occur.

- To use the probability mass function, so highlight false, press tab.
- Click enter, the first value will display. And it doesn't even show on the chart. Now, copy this formula down for all of the cells in Column A that contain values. So click cell B4, double click the fill handle. Double click, and there you see the familiar shape of the normal curve.
- The average, or the peak occurs right at 100, and you can see that the values spread out and that is a function of the standard deviation of 15.
- To calculate the specific value, of say, 84 occurring, then click in cell E1 enter the formula for normal distribution in excel then click enter. We get the value about 0.15%
- Follow the same process to go for the probably of 84 or less, we have TRUE for the cumulative probability. Type right parenthesis and press Tab
- We get a value of 84 or less will happen about 14.3% of the time.
- To find the cutoff, where 71% of values will occur below a specific point. In this case, let's do 71% , we see that 71% of values would be below 108.3.
- The same thing for 85, we see that 85% of the values will occur below 115.5. Note that 14% of values will occur between 115.5 and 108.3. And if you look at the chart again, you will see that the normal curve is higher, has higher probability toward the middle, around 100, and that even at 115. So if we wanted to see the value, where we had 95 or even 98% of values, we'd be much further over to the right.

Use of Poisson distribution:

POISSON.DIST function

Returns the Poisson distribution. A common application of the Poisson distribution is predicting the number of events over a specific time, such as the number of cars arriving at a toll plaza in 1 minute.

Syntax:

POISSON.DIST(x,mean,cumulative)

The POISSON.DIST function syntax has the following arguments:

- **X** - the number of events.
- **Mean** - the expected numeric value.
- **Cumulative** - a logical value that determines the form of the probability distribution returned. If cumulative is TRUE, POISSON.DIST returns the cumulative Poisson probability that the number of random events occurring will be between zero and x inclusive; if FALSE, it returns the Poisson probability mass function that the number of events occurring will be exactly x.

Remarks:

- If x is not an integer, it is truncated.
- If x or mean is nonnumeric, POISSON.DIST returns the #VALUE! error value.
- If x < 0, POISSON.DIST returns the #NUM! error value.
- If mean < 0, POISSON.DIST returns the #NUM! error value.
- POISSON.DIST is calculated as follows.

If cumulative = FALSE:

$$\text{Poisson} = \frac{e^{-\lambda}\lambda^{x}}{x!}$$

If cumulative = TRUE:

$$\text{Compossion} = \sum_{k=0}^{x} \frac{e^{-\lambda}\lambda^{x}}{k!}$$

Example:

Copy the example data in the following table, and paste it in cell A1 of a new Excel worksheet. For formulas to show results, select them, press F2, and then press Enter. If you need to, you can adjust the column widths to see all the data.

Data	**Description**	
2	Number of events	
5	Expected mean	
Formula	**Description**	**Result**
=POISSON.DIST(A2,A3,TRUE)	Cumulative Poisson probability with the arguments specified in A2 and A3.	0.124652
=POISSON.DIST(A2,A3,FALSE)	Poisson probability mass function with the arguments specified in A2 and A3.	0.084224

Use of exponential function:

EXPON.DIST function

Returns the exponential distribution. Use EXPON.DIST to model the time between events, such as how long an automated bank teller takes to deliver cash. For example, you can use EXPON.DIST to determine the probability that the process takes at most 1 minute.

Syntax:

EXPON.DIST(x,lambda,cumulative)

The EXPON.DIST function syntax has the following arguments:

- **X** - the value of the function.
- **Lambda** - the parameter value.
- **Cumulative** - a logical value that indicates which form of the exponential function to provide. If cumulative is TRUE, EXPON.DIST returns the cumulative distribution function; if FALSE, it returns the probability density function.

Remarks:

- If x or lambda is nonnumeric, EXPON.DIST returns the #VALUE! error value.
- If x < 0, EXPON.DIST returns the #NUM! error value.
- If lambda ≤ 0, EXPON.DIST returns the #NUM! error value.
- The equation for the probability density function is:

$$f(x;\lambda) = \lambda e^{-\lambda x}$$

- The equation for the cumulative distribution function is:

$$f(x;\lambda) = 1 - e^{-\lambda x}$$

Example:

Copy the example data in the following table, and paste it in cell A1 of a new Excel worksheet. For formulas to show results, select them, press F2, and then press Enter. If you need to, you can adjust the column widths to see all the data.

Data	**Description**	
0.2	Value of the function	
10	Parameter value	
Formula	**Description**	**Result**
=EXPON.DIST(A2,A3,TRUE)	Cumulative exponential distribution function	0.86466472
=EXPON.DIST(0.2,10,FALSE)	Probability exponential distribution function	1.35335283

To Measure Covariance:

I. Covariance formula = $\frac{\sum(x-\bar{x})(y-\bar{y})}{n}$

Procedure:

- For each data point,find its deviation from the Mean.
- Multiply the deviation for each pairs of data points.
- Find the sum of all these values and divide by the number of data pairs.

Interpreting covariance value:

0 - The data sets don't vary together.

Positive - The data sets tend to move in the same directions.

Negative - The data sets tend to move in the Opposite directions.

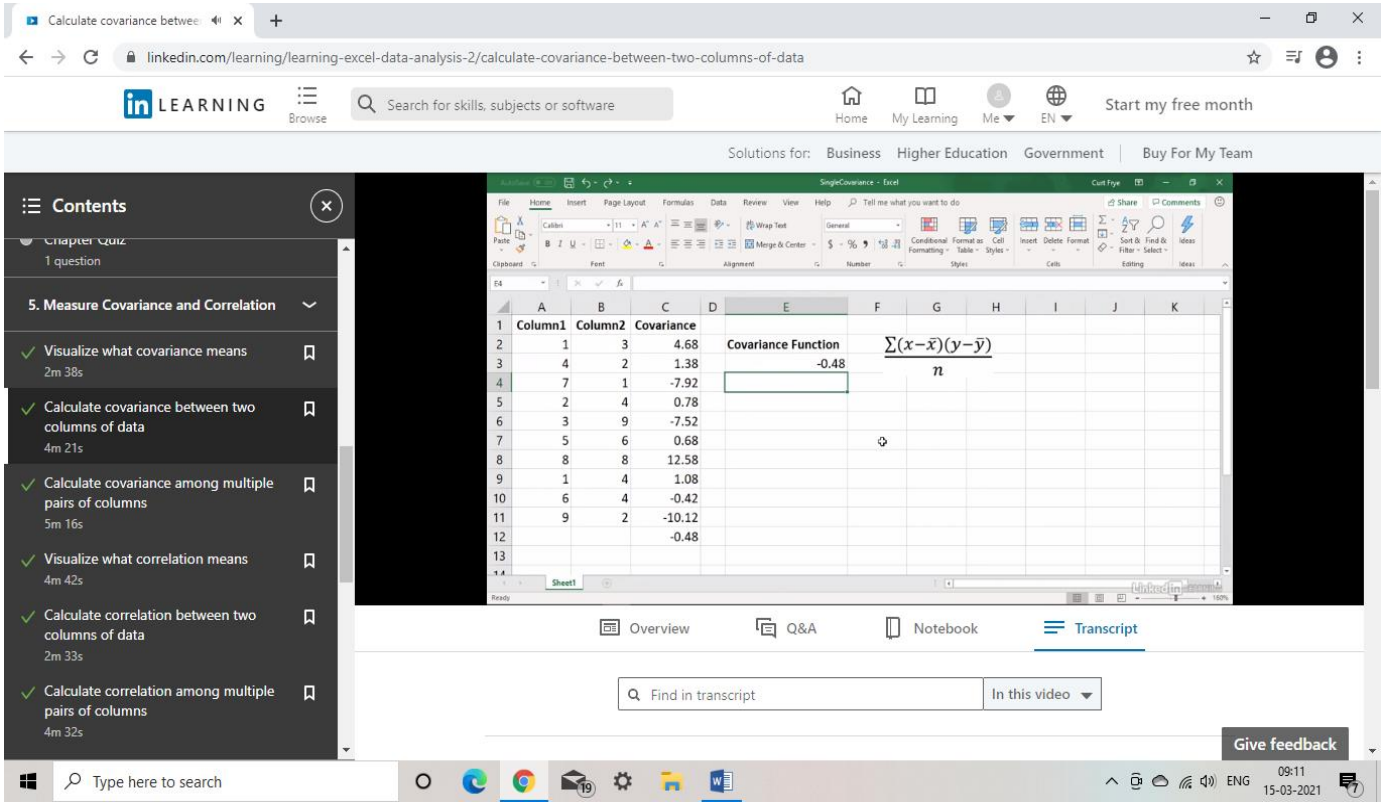
Calculate Covariance between Two Columns of data:

- Labeled column one and column two. Covariance is the average of all of the differences or variances for pairs of data points.
- Type in =(a2-average(a2:a11))*(b2-average(b2:b11))

Press enter. We get the average of column A and column B

- To find the average of all those covariance. And that is exactly the same as dividing by the number of data pairs.
- Type =AVERAGE(c2:c11) and click enter we get the covariance as -0.48,whivh is very small.
- To find between two columns type =covariance.p(a2:a11,b2:b11)
- Click enter we get the value as – 0.48.
- And also type =covariance.s(a2:a11,b2:b11) then click enter we get, -0.533333 a difference covariant function value. The difference is due to subtracting one from the number of data pairs.

Single Covariance:



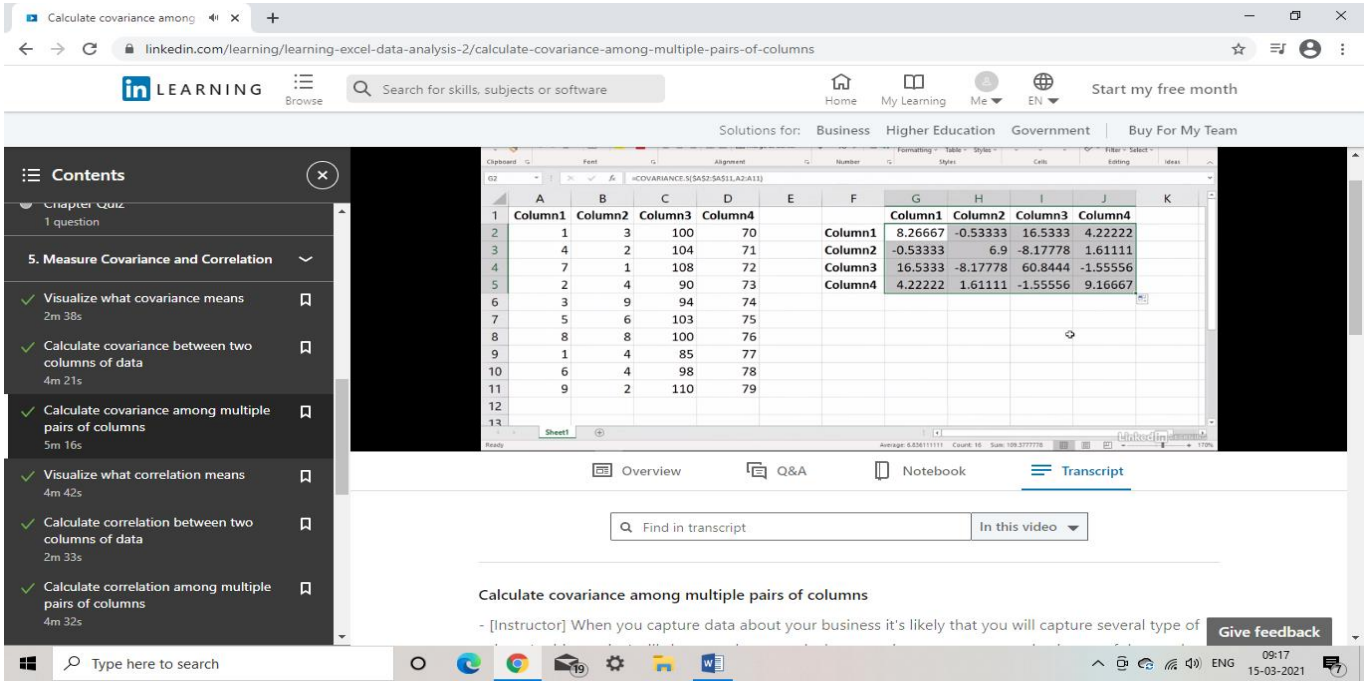
Calculate covariance between multiple pairs of columns:

Here for example we took about 4 columns

To find the covariance between

Column 1 and column 1	=COVARIANCE.S(A2:A11,A2:A11)
Column 2 and column 1	=COVARIANCE.S(B2:B11,A2:A11)
Column 3 and column 1	=COVARIANCE.S(C2:C11,A2:A11)
Column 4 and column 1	=COVARIANCE.S(D2:D11,A2:A11)

Multiple Covariance:



Drag the column to get the covariance in the balance columns respectively.

Measure Correlation:

II. Correlation formula = $\frac{\sum(x_i-\bar{x})(y_i-\bar{y})}{\sqrt{\sum(x_i-\bar{x})^2 \sum(y_i-\bar{y})^2}}$

Procedure:

- For each data point,find its deviation from the Mean.
- Multiply the deviation for each pairs of data points.
- Find the sum of all these values and divide by the number of terms

Interpreting correlated value:

0 - The data that is completely correlated

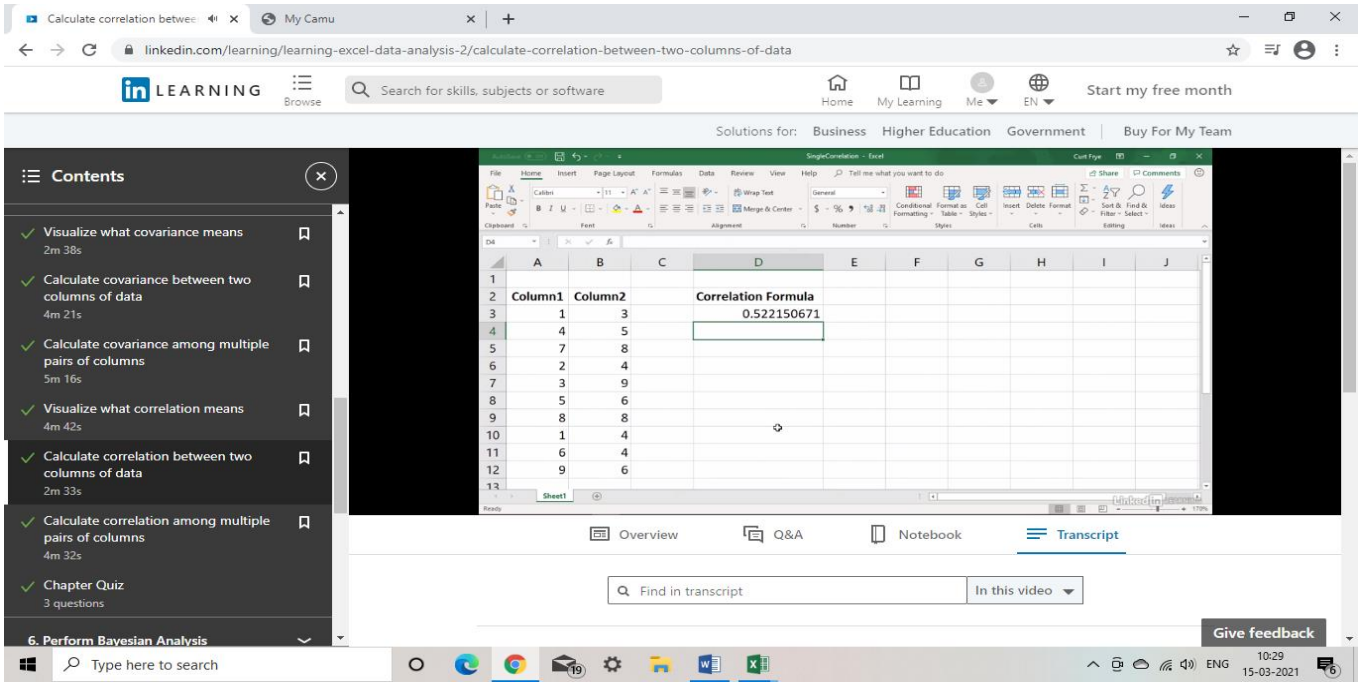
$\mathbf{0 > x \geq 1}$ - The data that is Positively correlated.

$\mathbf{-1 \leq x < 0}$ - The data that is Negatively correlated.

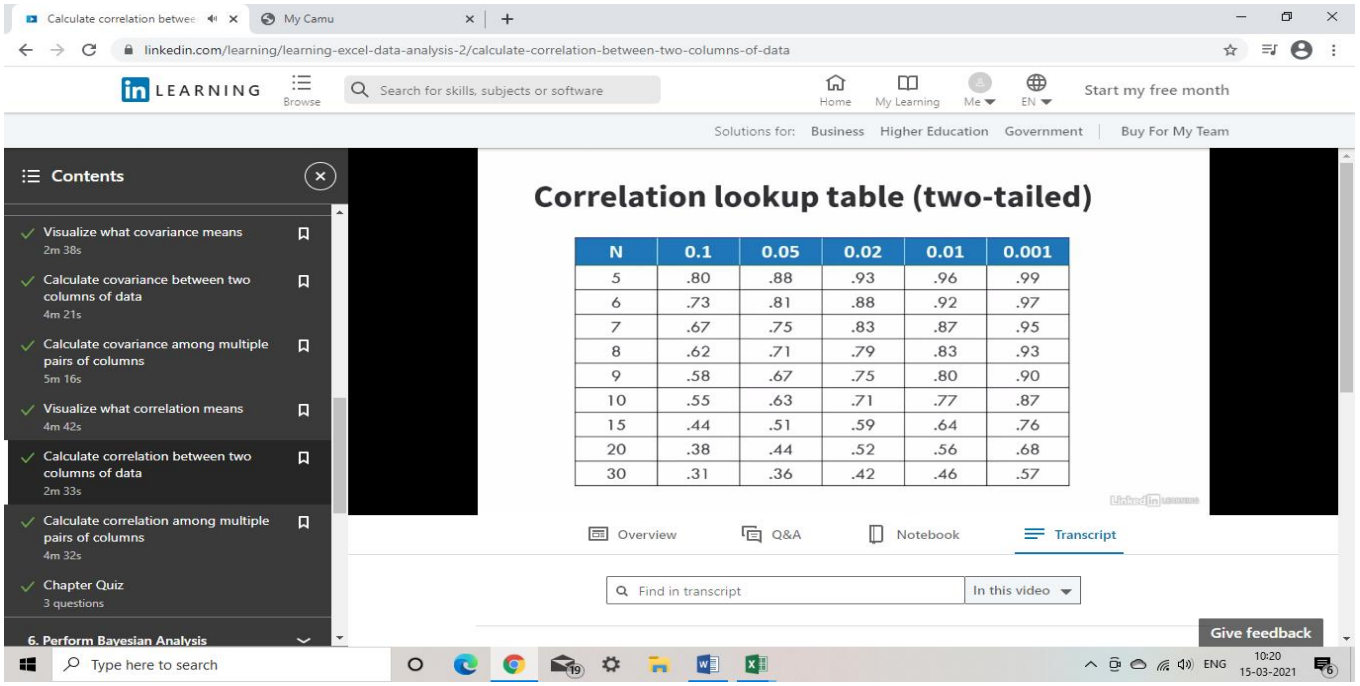
Calculate Correlation between Two Columns of data:

- The more samples you have, the lower correlation value you need for your result to be significant.
- Take two columns like column 1 and column 2
- To calculate the correlation in excel,using correl function type =correl(a3:a12,b3:b12)
- Press enter, we get the correlation values for the column 1 and column 2
- Using correlation two-tailed significant formula table we can find the percent of significant of the correlation values.

Single correlation:



Two tailed correlation table:



We took 10 values and o.52 as correlation, for the first column the value for significance is .55. So what that means is that my value of .52 is almost significant at the 90% level, but in fact, it is not. If I'd had 15 samples, then my value of 0.52 would be significant at both the 90%, or 0.1 and 95%, .51 levels.

Calculate correlation between multiple pairs of columns:

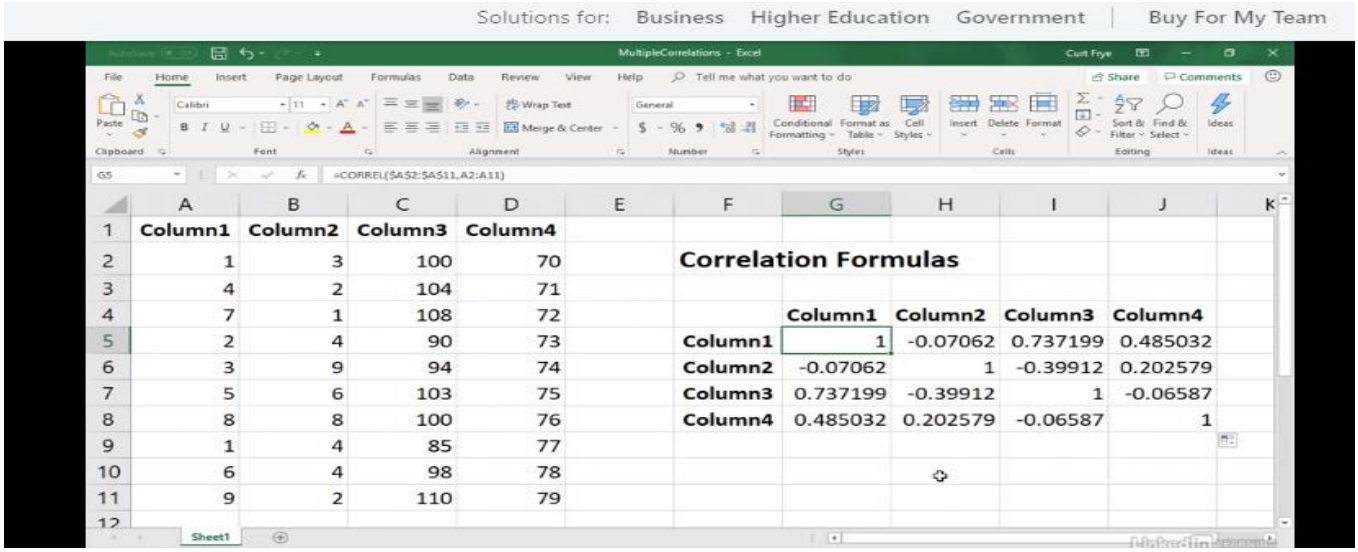
Here for example we took about 4 columns

To find the correlation between

Column 1 and column 1	=CORREL(A2:A11,A2:A11)
Column 2 and column 1	=CORREL(B2:B11,A2:A11)
Column 3 and column 1	=CORREL(C2:C11,A2:A11)
Column 4 and column 1	=CORREL(D2:D11,A2:A11)

And drag the formula for other respective columns.

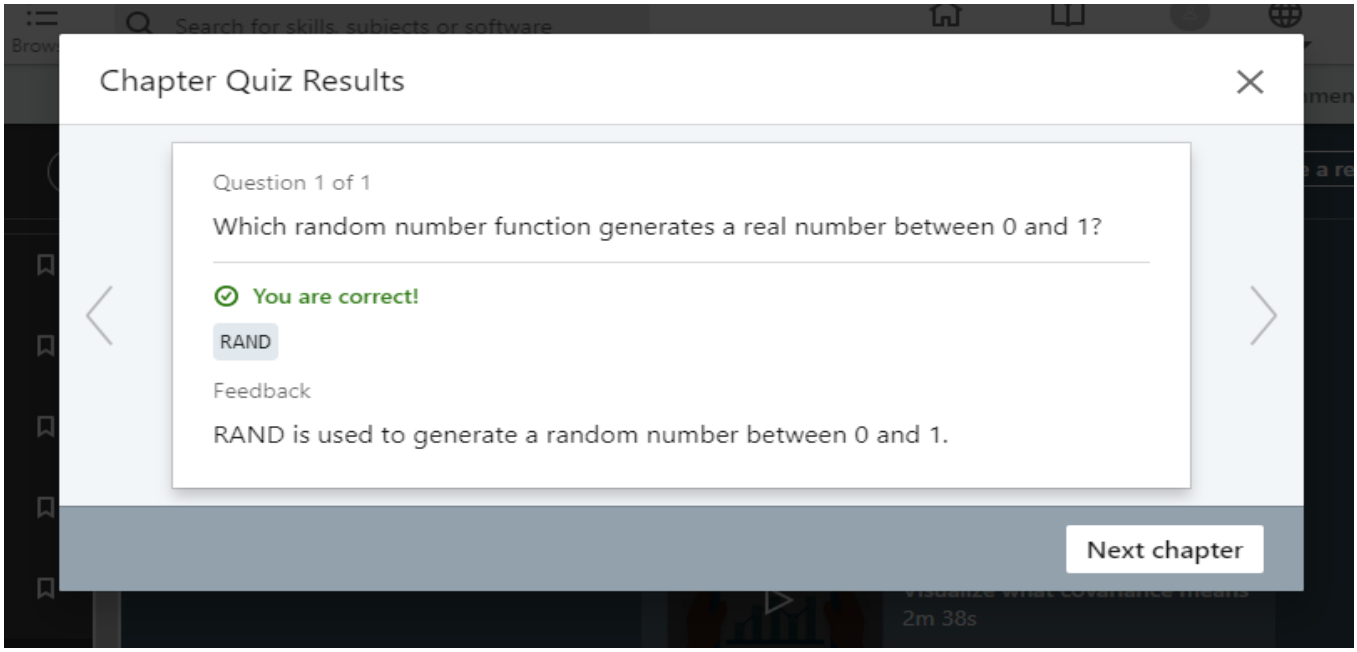
Multiple correlation:

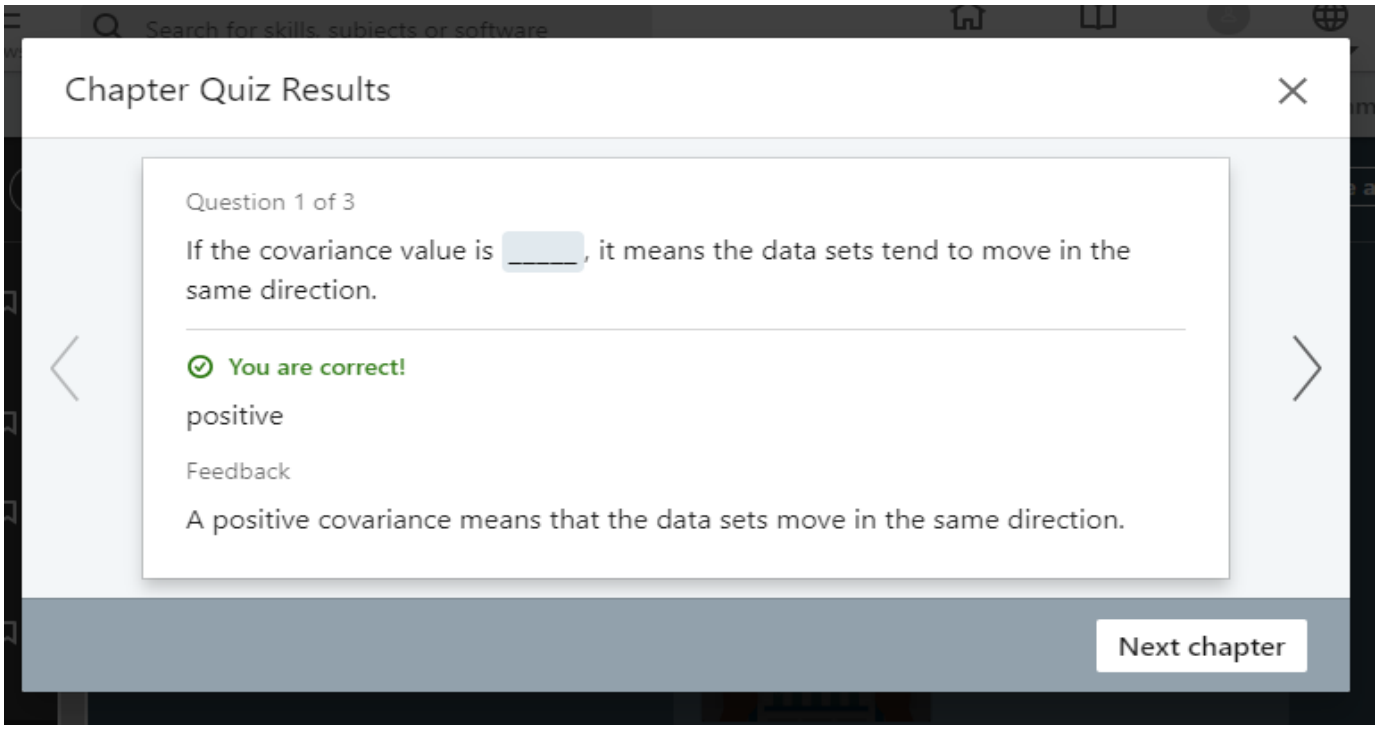


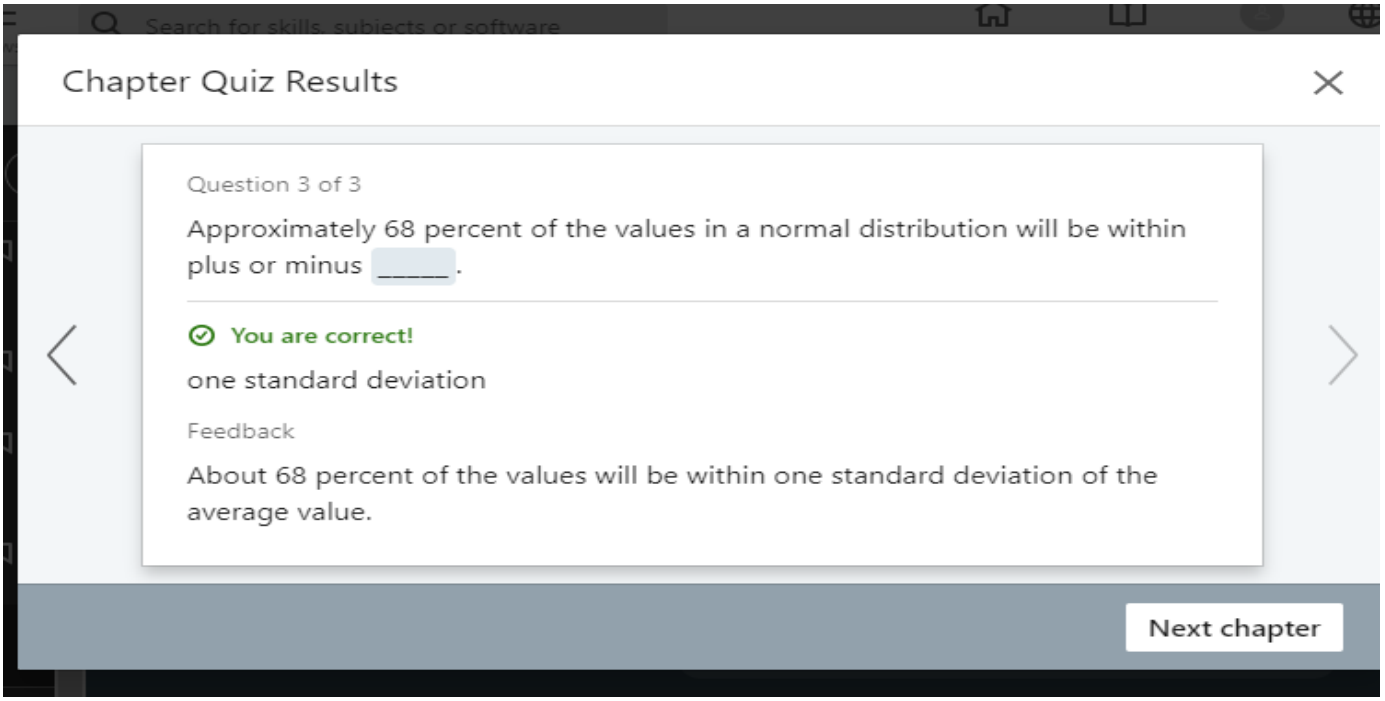
	A	B	C	D	E	F	G	H	I	J
1	Column1	Column2	Column3	Column4						
2	1	3	100	70		Correlation Formulas				
3	4	2	104	71						
4	7	1	108	72			Column1	Column2	Column3	Column4
5	2	4	90	73		Column1	1	-0.07062	0.737199	0.485032
6	3	9	94	74		Column2	-0.07062	1	-0.39912	0.202579
7	5	6	103	75		Column3	0.737199	-0.39912	1	-0.06587
8	8	8	100	76		Column4	0.485032	0.202579	-0.06587	1
9	1	4	85	77						
10	6	4	98	78						
11	9	2	110	79						
12										

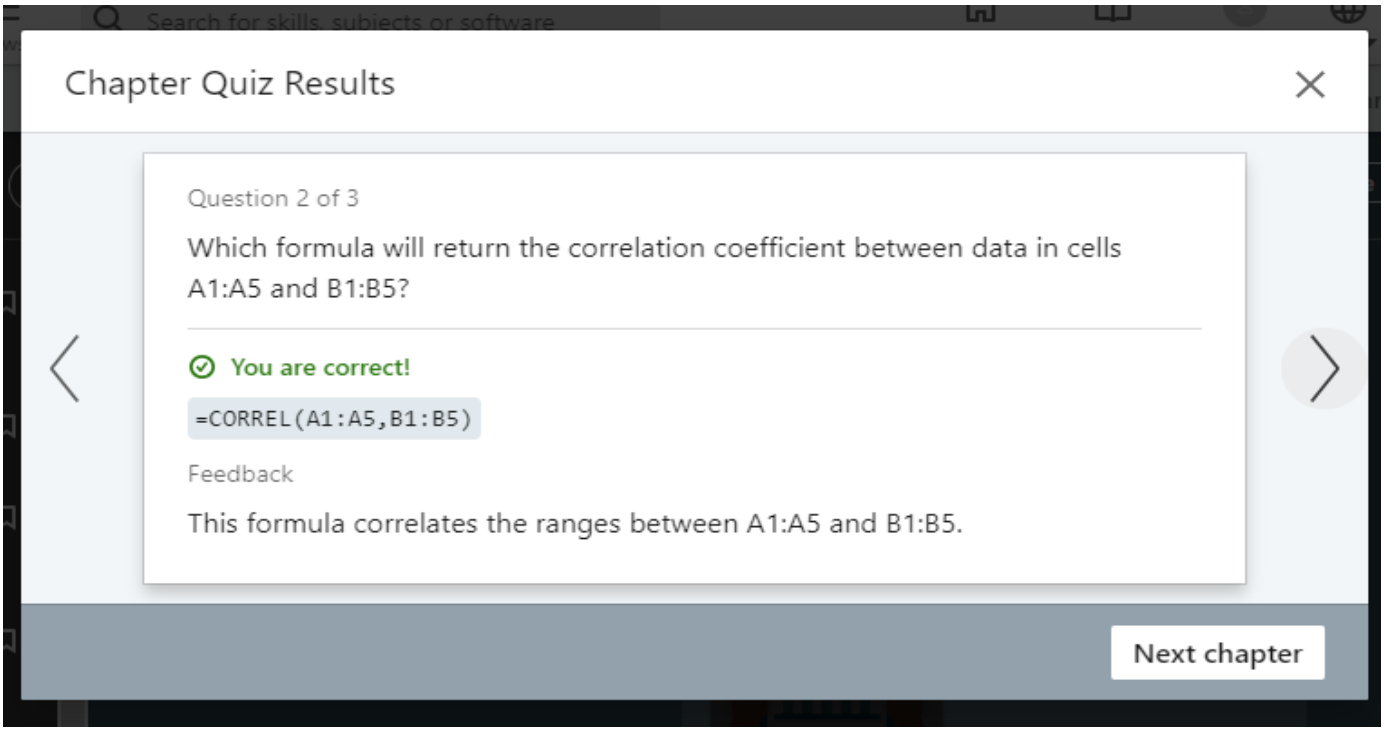
We finaly get the correlation values for multiple columns.

Quiz


Chapter Quiz Results
Question 1 of 1
Which random number function generates a real number between 0 and 1?
You are correct!
RAND
Feedback
RAND is used to generate a random number between 0 and 1.
Next chapter


Chapter Quiz Results
Question 1 of 3
If the covariance value is _____, it means the data sets tend to move in the same direction.
You are correct!
positive
Feedback
A positive covariance means that the data sets move in the same direction.
Next chapter


Search for skills, subjects or software
Chapter Quiz Results
Question 3 of 3
Approximately 68 percent of the values in a normal distribution will be within plus or minus _____.
You are correct!
one standard deviation
Feedback
About 68 percent of the values will be within one standard deviation of the average value.
Next chapter


Search for skills, subjects or software
Chapter Quiz Results
Question 2 of 3
Which formula will return the correlation coefficient between data in cells A1:A5 and B1:B5?
You are correct!
=CORREL(A1:A5,B1:B5)
Feedback
This formula correlates the ranges between A1:A5 and B1:B5.
Next chapter

CONCLUSION

The internship was a useful experience. It helped to gain new knowledge and skills. It provides a path to achieve several of our learning goals. I have learned many shortcut formulae in Excel using data.