Application on CourseList.xlsx

In order to enhance our knowledge and practice on some useful functions of Microsoft Excel we have used a file which consists of sample student grades, CourseList.xlsx. In this file there are many records of students taking four different courses in English. Let us consider those students taking “İNO203U Translation: English-Turkish course”. First of all we copy Student ID, Name and Surname fields for those 11 students taking this course from Data sheet of our file and after inserting a new worksheet called Application, we paste values into this new sheet. Now we have three columns of data in Application sheet; A column has Student ID, B column has Name and C column has Surname. First function we will use is CONCATENATE.

**CONCATENATE**

This function joins several text strings into one text string. We want to see the names and surnames of these students stored in one cell instead of two different cells; so, we use this function to join names and surnames, which are text string values, into one text string. We will be using D column to store new Name & Surname string for each student. Please look up the formula written in D3 cell of Application worksheet in CourseList.xlsx workbook.

=CONCATENATE(B3," ";C3)

We begin writing every function first with an equal sign “=” . After this sign we write the name of the function, in this case CONCATENATE, following with parentheses“(“). We always write the parameters between these parentheses, separating them with semicolon “;”. For this function, we can use as many parameters (text strings) to be joined as needed. We would like to join name and surname, two parameters, and also want to add a space between them, third parameter. In this function first parameter, cell reference for B3, is name; second parameter is space between name and surname; third parameter, cell reference for C3, is surname. D column has been filled with this formula and the results can be seen on the file.

**RANDBETWEEN**

We have a name list of students that are enrolled to this course but we don’t have grades for midterm and final. So we will generate their notes randomly. In order to realize this we can use RANDBETWEEN function, which returns a random number between the numbers we specify. This function has two parameters, bottom and top values. Grades for midterm exam can be any number between 0 and 100 so we can use 0 as bottom value and 100 as top value. Please look up the formula written in E3 cell of Application worksheet in CourseList.xlsx workbook.

=RANDBETWEEN(0;100)

Random number generation functions produce different values every time a change occurs on Excel. In order to use these values generated, we can copy them and then paste values so we can fix them. We fill the rest of the cells in E column with this function and obtain values for midterm grades. In F3 cell we write another function, again using RANDBETWEEN, using different parameters. This time bottom value is 20 and top value is 90. We fill F column with this function and obtain values for final grades. We copy these and paste the values to G and H columns respectively, the fixed grades.
**AVERAGE**

Now that we have obtained grades of students we can calculate their successes and average grade of the course. Success note of a student is calculated by summing %40 of midterm and %60 of final exam grades. This calculation can be seen on I2 cell.

\[ =G3*0.4+H3*0.6 \]

After filling this function to I column we obtain success values for students. But they have decimal values which we don’t want; so, we round them to the nearest integer by using the ROUND function formulated in J3 cell.

\[ =\text{ROUND}(I3;0) \]

ROUND function rounds a number to a specified number of digits and has two parameters. First one is the number we want to round and second is the number of digits to which we want to round. If we want to round a decimal number to nearest integer we use 0 as second parameter. By applying this function to J column we obtain rounded success grades.

Now we can calculate the average success of the class, using two different ways. First way is to divide sum of success grades by number of students. Second way is to use AVERAGE function.

J14 cell has the formula that calculates the sum of success notes.

\[ =\text{SUM}(J3:J13) \]

SUM function adds all the numbers in a range of cells. Our success notes are located in the range of J3:J13, which means all the selection of cells beginning with J3 and ending with J13. We denote a range by beginning and ending cells separated by a colon "::".

J15 cell has the formula that calculates the count of success notes.

\[ =\text{COUNT}(J3:J13) \]

Now that we have calculated sum of success grades in J14 and number of students in J15, we can calculate the average by dividing them in J16:

\[ =J14/J15 \]

or J17:

\[ =\text{SUM}(J3:J13)/\text{COUNT}(J3:J13) \]

Please note that both J16 and J17 have the same results because they have the same calculations. By these calculations we have calculated average student success by first way.

Let’s do it by second way: using AVERAGE function in J18.

\[ =\text{AVERAGE}(J3:J13) \]

AVERAGE function returns the arithmetic mean of arrays that contain numbers. In our case this array is the range denoted by J3:J13. Please note that the calculations in J16 and J17 have the same results as AVERAGE function in J18.

**IF**

Let us assume that this course is a pass/fail course which means that if the student has a success note over a given grade, let’s say 40, he/she passes the course, otherwise fails. We can decide this by comparing success of the student and passing grade. For a large number of students it will take some time and we can make errors; so, it is better to use IF function for logical comparisons like this.
IF function checks whether a condition is met, and returns a value if TRUE and another if FALSE. It has three parameters; first is the logical test, which is any value or expression that can be evaluated to TRUE or FALSE. Second parameter is value if true, which is the value that is returned if logical test is TRUE. Third parameter is value if false, which is the value that is returned if logical test is FALSE. In our case, logical test is comparison of student’s success with passing grade, value if true is Pass and value if false is Fail. Formulation for this statement is given in cell K3:

=IF(J3>40;"Pass";"Fail")

We can also decide if a student passes or fails the course by comparing success with average of the course. This formulation is given in cell L3:

=IF(J3>$J$18;"Pass";"Fail")

Please note the difference between these two IF formulations. First one contains comparison with passing grade 40, second one contains passing grade average, located in cell J18. But in the second formula, location of cell containing calculated average is fixed by using Absolute Cell Reference $J$18, instead of using Relative Cell Reference J18. You can examine the effect of this change by comparing the results of functions located in K and L columns. Try using Relative Cell Reference and see why we use Absolute Cell Reference instead!

**Defining NAME**

We have inserted a new worksheet on this workbook and renamed it as LetterNotes. On this new sheet we have entered lower limits on A column and Letter notes on B column. After entering these values we have selected range A1:B12 and entered notes in the Name Box in order to create a name for the Letter Notes table. Now that we have identified this table by a name, notes it is, we can refer to it using this name in formulas. We will be using this when deciding the letter notes of students.

**VLOOKUP**

Vertical lookup, VLOOKUP function looks for a value in the leftmost column of a table and then returns a value in the same row from a column specified. By default, table must be sorted in an ascending order. This function has four parameters. Lookup value is the value to be found in the first column of the table. Table array is a table of text, numbers or logical values, in which data is retrieved. Column index number is the column number in table array from which the matching value should be returned. The first column of values in the table is column 1. Range lookup is a logical value: TRUE means finding the closest match in the first column (sorted in ascending order), FALSE means finding an exact match.

If we consider our application, we want to find the matching letter notes for students’ success grades. By using VLOOKUP function we can achieve this. Please have a look at the formula in M3 cell:

=VLOOKUP(J3;notes;2;1)

Let us have a look at the four parameters of this function. Our table is located on LetterNotes sheet and has the lower limits of letter note grades and letters. First parameter is the lookup value, the value to be found in the first column of the table. Because we are looking up which range students’ success grades fall, this is our lookup value, which is located in J column. Second parameter is table array, limits of letter notes, which we have given a name of “notes” in previous topic. Third parameter is column index number, in this case 2, the second column of notes table, in which the letter notes are located. Fourth and last parameter is range lookup, we have given value 1, which means TRUE, so that we are looking up range, not exact match. This function will take students’ success grade and look up that value in notes table, beginning with the lowest value, because our table is sorted in ascending order. Whenever a close match is found for success grade, it will look up the second column of that row, which indicates the letter note for that student. You can try yourself for different students in order to understand how this function works.