
3. Hypertension

Hypertension is a widespread disorder of our age. Your task is to analyse the blood pressure history of a patient suffering from hypertension and receiving medication for it.

Blood pressure is highest at the end of the contraction of the cardiac chamber, this is called systolic pressure or in short systole. The lowest value is taken at the end of the relaxation phase of the heart, this is diastolic pressure or in short diastole. Blood pressure is considered high if the systolic pressure is higher than 130 Hgmm and the diastolic pressure is higher than 85 Hgmm.

The patient measured his/her blood pressure in the morning for a whole year and recorded the values of systolic and diastolic pressures as well as the heart rate.

During the solution take the followings into consideration:

- *You may perform auxiliary calculations to the right of column K.*
- *Whenever possible, use a formula, function or reference in the solution.*
- *If you want to use the results from a previous exercise part but you could not solve it completely, use its solution as it is, or enter a data considered reasonable. This way you may receive mark for this exercise part as well.*

1. Import the data from file *bloodpressure.txt*, which is a UTF-8 encoded file tagged by tabs into the worksheet of the spreadsheet processor so that the first value gets into cell *A1*. Save the table as *high* in the default format of the spreadsheet processor.
 2. In column *date* set the date format according to the example. (The column contains each day of the year in increasing order. The days can be entered manually if you could not convert the numbers into dates.)
 3. Enter the limiting values “130” for systolic and “85” for diastolic pressure, measured in Hgmm, into the suitable columns of the *Limiting value* row of the auxiliary table on the right.
 4. Determine the average, the highest and the lowest values of all three data columns (systole, diastole, heart rate) using functions. Display the results in the suitable columns of rows *Average*, *Highest value* and *Lowest value* of the auxiliary table on the right. Round the average of the measured values to an integer using a function.
 5. In how many cases did the measured systolic pressure and diastolic pressure values exceed the corresponding limiting values? Determine the value using a formula for both systolic and diastolic pressure in the suitable columns of row *Exceeded limiting value* of the auxiliary table.
 6. On which days did the patient measure the highest values? Determine the dates corresponding to the highest systolic and diastolic pressure and the highest heart rate using a formula in the suitable columns of row *Date of highest value*. (If for some data series several such days exist, then you can display any of these.) Format these cells using the same format as for column *date*.
 7. On how many days did the patient not measure his/her blood pressure? Determine the result using a function in the cell next to text *No measurement*. (You can assume that on these days all three values are missing but the given date appears in column *Date* of the table.)
 8. In the cells of column *Exceeds* display word “yes” using a formula that can be copied flawlessly, if on the given day both the systolic and diastolic pressures measured exceeded the corresponding limiting values. Leave the cell blank otherwise.
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9. How many days were there when both systolic and diastolic pressures exceeded the corresponding limiting values? Determine the result in the cell next to text **“Number of excesses”**. In the cell next to text **“As a percent”** determine what percent of the days containing measured values did it happen.
10. Set the column widths so that the content of each cell is readable and the width of cells containing numbers is the same.
11. The unit of blood pressure values in columns B and C containing the data should be **“Hgmm”**. The content of the cell next to **“As a percent”** should be displayed in percent format but without decimal digits.
12. Set the font style, the cell borders and the cell shadings according to the example. Align the data in row 1 and column E centered horizontally and the data in column G to the right.
13. On a separate worksheet create a line chart that shows the daily values of systolic and diastolic pressures. The legend should be at the bottom and the title of the diagram should be **“Changes in the blood pressure in 2011”**. The days should not be displayed on the horizontal axis. On the chart the curve of systolic pressure should be displayed in red and the diastolic pressure in yellow.

30 marks

Example:

	A	B	C	D	E	F	G	H	I	J
1	date	systole	diastole	heart rate	exceeds			systole	diastole	heart rate
2	2011. 1. 1.	123 Hgmm	76 Hgmm	80			Limiting value	120	80	
3	2011. 1. 2.	119 Hgmm	79 Hgmm	78			Average	124	82	75
4	2011. 1. 3.	121 Hgmm	78 Hgmm	81			Highest value	128	83	80
5	2011. 1. 4.	122 Hgmm	81 Hgmm	78			Lowest value	85	75	60
6	2011. 1. 5.	95 Hgmm	65 Hgmm	81			Exceeds limiting value	124	74	
7	2011. 1. 6.	122 Hgmm	71 Hgmm	80			Date of highest value	2011-01-03	2011-01-04	2011-01-05
8	2011. 1. 7.	113 Hgmm	71 Hgmm	82						
9	2011. 1. 8.	111 Hgmm	73 Hgmm	69			No measurement	12		
10	2011. 1. 9.	107 Hgmm	72 Hgmm	72			Number of excesses	30		
11	2011. 1. 10.	120 Hgmm	74 Hgmm	71			As a percent	31%		
12	2011. 1. 11.	144 Hgmm	75 Hgmm	66						
13	2011. 1. 12.	125 Hgmm	75 Hgmm	76						
14	2011. 1. 13.	128 Hgmm	75 Hgmm	71						
15	2011. 1. 14.	151 Hgmm	87 Hgmm	69	yes					

