Lab-session 3

1) Modify the worksheet which contains the periodic table of task 4 in Lab-session 2 by adding to it molecular weight calculator. In case you did not save your answer you may download the answer from the course website. Implement the calculator by using some VLOOKUP-functions. The table should work in such a way that the formula for a molecule is just entered by the symbols of the atoms and the number of times the atom occurs in the molecule. Pick up the atomic weights from the table and sum up all weights. For instance the formula for Methane is CH_4 with molecular weight

$$12.011 + 4 * 1.00794 = 16.06.$$

Your table should produce

symbol:	C	H
times:	1	4
partial mass:	12.011	4.03176
molecular weight:	16.04	

Molecular weight Methane

Test your table for water $H_2O \rightarrow$ 18.02, salt $NaCl \rightarrow$ 58.44, sugar $C_{12}H_{22}O_{11} \rightarrow$ 342.30, carbon dioxide $CO_2 \rightarrow$ 56.02, ethyl alcohol $C_2H_6O \rightarrow$ 46.07 and cinnabar $HgS \rightarrow$ 232.66.

2) For large values of n Stirling's approximation reads

$$\ln(n!) \approx n \ln(n) - n \qquad \text{for } n \gg 1.$$

   a) Design a user defined function for the right hand side of this equation.

   b) Test the precision of this approximation by using the Excel built-in function FACT to compute the factorial. How good is the approximation for $n = 100$?

3) For small values of x you can approximate sin(x) by

$$\sin(x) \approx x - \frac{x^3}{6} \qquad \text{for } x \ll 1.$$

   a) Design a user defined function for the right hand side of this equation.

   b) Test the precision of this approximation by using the Excel built-in function SIN. How good is the approximation for $x = 0.1$?

4) Write a user defined function which converts Fahrenheit to Celsius according to the formula
$$\text{Celsius} = \frac{5}{9}(\text{Fahrenheit} - 32).$$

Convert 90 degrees Fahrenheit into degrees of Celsius.

5) Write a user defined function which converts three separate strings of characters into one single string. Declare the variable type of the function and the arguments properly as strings. Test your function by writing into the cell A1 "City", into A2 "University" and into A3 "London". Your function should convert this into "City University London". (You can join two character strings by "ABCD" & "EFGH" → "ABCDEFGH".)