Lab. 1 - Expressions and Functions

For the exercises below, use the Spyder IDE. Make sure you create a working directory in your computer and select it in the File Explorer window of Spyder. In the Editor window create a file "lab1.py", and define the functions with the signatures below. Test the functions created from the console, after importing the file with command "import lab1".

1. **def equation_1(a,b):**
   Returns the solution of equation **ax +b = 0** (assume a ≠ 0).

2. **def equation_2(a,b,c):,**
   Returns the solution of equation **ax^2 +bx + c = 0** (assume that a ≠ 0, and b^2-4ac ≥ 0).

3. **def sigmoid(x, b, k):**
   Returns the value of function sigmoid (centred at zero), with parameters **b** and **k**, at an arbitrary point **x** in the interval x ∈] -∞ , +∞[. Remind that
   $$sigmoid(x, b, k) = \frac{b}{1+e^{-kx}}.$$

4. **def gauss(x, s):**
   Return the value of function gauss (centred at zero), with parameter s (standard deviation), at an arbitrary point **x** in the interval x ∈] -∞ , +∞[. Remind that
   $$gauss(x, s) = \frac{1}{s\sqrt{2\pi}}\, e^{-\frac{1}{2}\left(\frac{x}{s}\right)^2}$$

5. **def truncate(x, n):**
   Returns the value of the real number **x**, truncated to **n** decimal places. For example, the call *truncate(3.141592, 3)* should return 3.141.

6. **def length_2(u):** and **def length_3(v):**
   Returns the length of vector **u**, encoded as a list of, respectively, 2 and 3 coordinates (i.e. <x,y> and <x,y,z>.

7. **def vec_sum_2(u,v):** and **def vec_sum_3(u,v):**
   Returns the sum of vectors **u** and **v**, encoded as lists, with respectively 2 and 3 dimensions.

8. **def dot_product_2(u,v):** and **def dot_product_3(u,v):**
   Returns the dot product of vectors **u** and **v**, encoded as lists, with respectively 2 and 3 dimensions.

9. **def angle_2(u,v):** and **def angle_3(u,v):**
   Returns the angle, in radians, made by vectors **u** and **v**, encoded as lists, with respectively 2 and 3 dimensions.