Homework 2

Use docstrings and good style, and make sure to test your code! Write your solutions in a file named `yourname_homework2.py` and submit to `m.spacek@lmu.de` before class 04 (May 31).

Hint: the solutions to all of these are no more than a few lines each. If your solution is long and complicated, you're probably doing it the hard way!

1. Your experiment collects N measurements. Write a function called `norm()` that accepts a list of values of arbitrary length N, and returns a list of the normalized values (i.e., each value divided by the sum of the values).

   e.g. `norm([1, 6, 0, 3])` returns `[0.1, 0.6, 0.0, 0.3]`

   Hint: the `sum()` function is very useful here

   - do you have to do anything different for your function to also accept a tuple instead of a list? What about to make it return a tuple instead of return a list?
   - try to write your function using only two lines of code (not including the `def` line and the docstring)

2. Take the following data (a list of lists, one experiment per row) and use your `norm()` function to create a normalized version of the data in a new list of lists called `normdata`:

   ```
   data = [[9.1, 2.1, 0.9, 1.5, 1.1],
           [4.4, 2.2, 3.3, 5.5, 6.6],
           [0.1, 0.2, 0.3, 0.4, 0.5]]
   ```

   - can you do it in one line of code?
   - check that the normalized values for each experiment in `normdata` really do add up to 1.

3. Write a function called `vectorsum()` that returns the vector sum of two lists, i.e., the sum of the values at the corresponding positions in two input lists. Example:

   ```
   x = [2, 3, 4, 5, 0, 0, 0, 2, 2, 0]
   y = [0, 4, 2, 4, 5, 1, 0, 5, 3, 5]
   ```

   `vectorsum(x, y)` returns `[2, 7, 6, 9, 5, 1, 0, 7, 5, 5]`

   Hint: use the `zip()` function to iterate over both lists at the same time

   - what happens with `zip()` if the lists aren't the same length?

4. The measurements in your experiment in question 1. now have exciting names, e.g. `'a'`, `'b'`, `'c'`, `'d'`. Write a function called `normd()` that takes a dictionary with an arbitrary number of key:value pairs, and returns a dictionary with the same keys, but with normalized values. Example:

   `normd({'a':1, 'b':6, 'c':0, 'd':3})` returns `{'a':0.1, 'b':0.6, 'c':0.0, 'd':0.3}`

   Hint: some dict methods like `.keys()`, `.values()` and `.items()` will be very useful

- try to write your function using only two lines of code (not including the `def` line and the docstring)