Programmierpraktikum

Exercise Sheet #7

WS, 2012/2013

Summation

Check the code found in
http://itp.uni-frankfurt.de/~gros/Vorlesungen/ProgPrak/Java-control-flow.html#%2821%29
to calculate the sum:

$$\lim_{N\to\infty} \sum_{n=1}^{N} \frac{1}{n^2} = \frac{\pi^2}{6}$$

The exact result in *double precision* should be 1.6449340668482264. What is the error of adding the numbers from smaller to bigger, and from bigger to smaller for the converged series? Which one is more precise and why?

Call by value / Call by reference

Define a class `Book`, which has a string variable `title`. This title is assigned by the argument to the constructor. In addition, add a method (setter) to set the value of the variable `title` once the object is already initialized.

Make a program with a function `swapThem`. The function should accept two `Book` object variables and swap their values, that is, after calling the function with two variables a and b, outside of the function the value of b is the previous value of a and the value of a is the previous value of b. Print the values before and after the application of the function to assure that it is working properly.

- Notice that it does not work out if you simply define `a=b`, why? Are objects passed as references or is a reference to the object passed as a value?
- If possible, overload the function `swapThem` to accept arguments that are both:
  - primitives (e.g. `int`, `char`)? If it is not possible, explain why.
  - strings? If it is not possible, explain why.

Are the arguments passed by value or by reference?

Interfaces & Input

Based on the code from the class:
http://itp.uni-frankfurt.de/~gros/Vorlesungen/ProgPrak/Java-OOP.html#%2819%29
write a program where you ask the user at the beginning:

- how many "heroes" are there going to be (at least the options 1, 2 and 3 heroes should be possible),
- which character will each "hero" be,
- what color will each one have (ANSI colors are red, yellow, blue, green, magenta, cyan, black, white),
- at which speed will each one move initially,

and then the program should show the dynamics of the heroes similar to the original code, but according the options chosen by the user. When they hit each other, they should change directions.

Hint: you can inspire yourself in the Numbers game for how to get user input.