1001ICT Introduction To Programming 1 2013-2
Laboratory 4

School of Information and Communication Technology
Griffith University

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When	Teaching week 5
Goals	In this laboratory you will write programs that use variables, constants and functions.
Marks	3
Robot	CalibotNXT2
Track	WhiteBlack Track

1 Preparation

Before your lab class:

- Print these lab notes. You need to refer to them *a lot* before the lab class and during it.

- Read up to section 11 of the lecture notes.

- Browse the `console` and `nxt` environment documentation available at http://www.ict.griffith.edu.au/arock/itp/students/mash/ and in the lecture notes.

- You can experiment and create the programs before your class.

2 Pre-laboratory questions (0.5 marks)

Answer the following in the spaces provided, *before your laboratory class.*

1. For each of the following quantities, which numeric data type would be the *best* choice: `int`, `long`, `float` or `double`?

    (a) the number of music tracks stored on a particular iPod classic with more than 50 GB of storage:

    _____

    (b) the exact total number of bytes of music information stored on that iPod: _____

    (c) the fraction of the music tracks on that iPod that are instrumental (i.e. without words):

    _____

    (d) the exact number of people in Australia that own an iPod: _____

    (e) the percentage of Australians that own an iPod: _____

    (f) the exact number of people in the whole world that don't have an iPod, don't want an iPod, don't know what an iPod is, or would just like us to stop going on about iPods: _____

2. Consult the documentation for the `console` environment to answer these questions:

    (a)   i. What method do you use to read a whole number (less than 1 billion) typed by the user?

    _____

ii. Is it a procedure or a function? _____

(b) i. What method do you use to read a fractional number typed by the user? _____

  ii. Is it a procedure or a function? _____

(c) The mathematical constant π is predefined in all environments with what name? _____

3. Consult the documentation for the `nxt` environment to answer these questions:

(a) i. What method do you use to set a rotation sensor to zero? _____

  ii. Is it a procedure or a function? _____

(b) i. What method do you use to get the value from a rotation sensor? _____

  ii. Is it a procedure or a function? _____

3 Activities

All programs must have:

- header comments showing the name of the file, the author's name, and the purpose of the program; and

- use constants, at least where suggested.

3.1 MaSH console program 1 (0.5 marks)

- Write a program that reads a whole number of seconds and prints how many whole hours, minutes, and left-over seconds that represents.

- The program might look like this when it runs (See appendix A of the lecture notes for an explanation of this console session figure):

```
$ java Seconds
Total seconds: 10000
Hours: 2
Minutes: 46
Seconds: 40
$
```

3.2 MaSH nxt program 1 (1 mark)

- Write a program that drives the calibot forward until dark paper is reached, but them makes it reverse direction and return to its original starting point, as in this movie.

- Use constants to define the ports used.

- Important: When using most sensors, it is usually a good idea to have the robot wait for half a second, between setting up the sensors and using them. This allows the sensor to stabilise.

3.3 MaSH console program 2 (1 mark)

- This problem will be revealed during the laboratory class.

- The program must show the units for inputs and outputs.

3.4 MaSH nxt program 2 (no marks, just kudos)

- Extend MaSH nxt program 1 so that when it has finished moving forward, it displays the distance travelled in rotation sensor counts, and in centimetres. The numbers should be labelled so the user can see which number is which.

4 After the Laboratory

- Organize the work you have done into folders on your network drive.