Last modification: January 11, 2020

RBE 1001: Introduction to Robotics
C-Term 2019-20
HW 1.1: Programming Essentials – Expressions and Flow Control

1 Introduction

Continuing with fundamentals of C++ programming, here we introduce expressions and assignments, followed by *flow control*: conditionals (`if` statements) and loops (`while` and `for` loops). You are not responsible for each and every topic in these chapters, but you should understand them enough to do the assigned problems, which focus on the concepts that are important to this course.

2 Expressions and assignments

From Chapters 3 & 4 in Nyhoff, be sure that your are familiar with the following terms and concepts:

- Chapter 3
  - Fundamental types: `bool`, `char`, `int`, `long`, `float`, `double`
  - Qualifiers: `const`, `unsigned`
  - Integer representations: decimal and hexadecimal
  - Boolean literals: `true`, `false`
  - Declarations and definitions
  - `string`
  - variables and constants
- Chapter 4
  - `#include` statement and libraries
  - Basic operators: `+`, `-`, `*`, `/`
  - Assignment operator
  - `cin`, `cout`
  - Increment/decrement operators
  - Escape sequence
  - type conversion
  - whitespace

2.1 Practice problems

Useful "Test Yourself" Problems from Nyhoff:

- Chapter 3
  - 1-12
  - 41-45
- Chapter 4
  - Section 4.2: 9-18
  - Section 4.3: 1-26
  - Section 4.4: 11-17

3 Flow control

Read Chapter 5 in Nyhoff. The chapter is very detailed and pretty long. You can safely skip Section 5.4 and probably skim a lot of the rest. The critical syntax for flow control is presented in the gray boxes (though the logical operators in Section 5.2 are not – be sure you can apply all of them). You should be familiar with the following terms and concepts:

- Chapter 5
  - Block and scope
  - Conditionals, the `if` statement, and nested `if` statements
  - Flow diagram
  - Loops: `while` and `for` statements
  - Comparison operators: ==, <, <=, etc.
  - Logical operators: `!`, `||`, `&&`, etc.

3.1 Practice problems

Useful "Test Yourself" Problems from Nyhoff:

- Chapter 5
  - Section 5.2: 5-17
  - Section 5.4: 1-13
  - Section 5.5: 1-11

3.2 Problems

In Nyhoff,

1. Chp. 3, Exercise 61. For Convenience, submit your code in a `.cpp` file.
2. Chp. 3, Programming problem 4.
3. Chp. 4, Exercises 13 - 17 in Section 4.5. For Convenience, submit your code in a `.cpp` file.
4. Chp. 4, Programming problem 3.
5. Extend the program in the previous exercise to allow repeated inputs until the user enters a '0', in which case the program will exit.
6. Chp. 5, Programming problem 11 in Section 5.5.

3.3 To submit

For convenience, put the answer to each problem is a separate `.cpp` file and submit all the files separately or as one `.zip` file. Title each file with "`problem<prob#>.cpp`", replacing the placeholder as appropriate. For example, "`problem1.cpp`".