Midterm 1 Review

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We summarize the key topics for the Midterm 1 in this document.

1 Numbers and objects

1.1 Variables

- Variable and its value; Define a variable; Assign value to a variable.
- Naming of variables.

1.2 Number types

- Different number types `int`, `short`, `long`, `float`, `double`, etc. No need to memorize the detailed numeric of the bounds of each number type.

1.3 Arithmetic

- Know different arithmetic operators `+,-,*,/`; the increment and decrement operators `++`, `--`;
- Know integer division;
- Know the remainder operator `%`.

1.4 Math functions

- Need to use `# include <cmath>` for math function; Know different math functions; Know how to write math formula in C++

1.5 More data types

- Constants;
- Boolean type `bool`, Character type `char`;
- Casting between different types, static casting;
- Know the reason of round off error.

1.6 String type

- String as a sequence of characters;
- String variable concatenation by `+`;
- String input via `cin` and `getline()`, zero-indexing in C++;
- String functions `length()`, `substr()`;
- String operator `[]`;

1.7 Input & Output

- Know how to use `cin` to receive input, and how to use `cout` to output;
- Format of output;

1.8 Errors

- Compile-time error, or syntax error;
- Run-time error, or logic error;
- Exception errors;

2 If else statement

2.1 Basic syntax

- Basic syntax of `if else` statement, the conditional operator;

2.2 Comparing numbers and strings

- Different relation operators `<, >, ==, !=, <=, >=`;
- Comparison between numbers;
- Lexicographic ordering of strings, comparison between strings; ASCII table (You do not need to memorize the table, but you need to know some common rules, such as numbers are ranked ahead of letters; and capital letters are ranked ahead of their lower cases.)

2.3 Multiple alternatives

- Know how to correctly use `if elseif else` statements; Pay attention to the order of each statement;

2.4 Nested branches

- Know how to draw flow charts of a given project;
- Know how to implement nested branches;

2.5 Boolean variables and operations

- Boolean values are either `true` or `false`;
- Boolean operation `&&, ||, !`; Value table of these operations;
- Precedence among the operators;
- Avoid common errors when using boolean operators;

3 Loops

3.1 `while` loop

- Know the mechanism and the syntax of `while` loop; Notice that the defined variables cannot be called outside the loop.
- Avoid common errors when using `while` loop;
- Know how to use hand-Tracing to analyze different loop algorithms;

3.2 `for` loop

- Know the mechanism and the syntax of `for` loop; Notice that the defined variables as well as the counter cannot be called outside the loop.
- Pay attention to the bounds in `for` loop;

3.3 `do while` loop

- Know the mechanism and the syntax of `do while` loop; Notice that the `do while` loop will always run for at least one iteration.

3.4 Nested loops

- Be able to analyze nested loops, i.e., you should be able to write down the output of a piece of code containing the nested loops;

3.5 `break` and `continue`

- You should know that `break` statement exists a loop without executing the remaining part of the loop; `break` can only jump out of the CURRENT loop;
- The `continue` statement skips the remaining part of the loop and continues to the next iteration; `continue` statement can only skip one iteration of the CURRENT loop;