School of Computer Science
University of Guelph

CIS*3490 The Analysis and Design of Algorithms

Winter 2022
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Assignment 3 Guide

You can develop your programs using any C system, as long as your programs can be correctly compiled and executed on the Linux system in SoCS.

You are allowed to use standard library functions. Your programs should be submitted as a tar file containing files like

readme.txt, main.c, P11.c, P12.c, P21.c, P22.c, P23.c, makefile.

Any compilation warning will result in a mark deduction. There will be some marks allocated for documentation.

Each file should have a comment at the beginning containing your name, id, date, and the assignment name.

The *readme* file should contain the following:

- Name, id and assignment number
- A brief and clear description of how to compile and run each program.
- Comparison and analysis for Q2.4.

Each function should have a brief comment describing its purpose. Also, any section of code where it is not easily apparent what the code does should have a short comment.

Hints for individual questions:

1 You may visualize the example in the handout by drawing the integer line at the bottom, and a short line above it representing an interval. Visualizing the example may help you understand the problem and develop algorithms.

1.1 Find the minimum and maximum endpoints (integers) of all the intervals. Scan the integer line between the minumum and maximum. For each of the points, check all the intervals to see how many intervals include it.

1.2 You may sort the endpoints of all the intervals, and also find the minimum and maximum of the endpoints. By scanning the sorted endpoints you can find the maximum number.

1.1, 1.2 The output could be something like:

```
Brute force program for finding max number of intervals
The maximum number of intervals: 16207
The intervals include point: 29130
Time for finding the maximum number: 11263 ms
```

2.1, 2.2, 2.3 You can follow the algorithms in the text. The output could be something like:

```
A Brute force program for string search.
Enter a pattern: excluding
Count: 4
Shifts: 2944147
Execution time = 14 ms
```

In searching a pattern, the counts of different algorithms must the same. The numbers of shifts of different implementations of the same algorithm could differ slightly.