CS 3510: Algorithms

Assignment 0

Assignment

Problems identified by x.y(z) denote the problem “y”, in chapter “x” of the textbook, with part “z”. If “z” is not noted, then the entire problem is required.

Assignment 0a

- 0.1(a, b, c, d, e, f) In each case show your derivation.
- 0.2(b) Show your derivation.

Assignment 0b

- 0.1(g, h, i, j, k, l) In each case show your derivation.
- 0.2(a) Show your derivation.
- Complete the tasks for Programming Assignment `fib1`.

Assignment 0c

- 0.1(m, n, o, p, q) In each case show your derivation. Prove o, don’t just quote the known result. Don’t spend too much time on q.
- 0.2(c,) Show your derivation.
- Complete the tasks for Programming Assignment `fib2`.

Programming Assignment `fib1`

- Create a directory in your repository name `00-fibonacci` to store your work for this task.
- Implement `fib1` from the textbook in `fib1.cpp`.
- Experimentally determine the running time of the `fib1`. Use best practices for eliminating granularity and fluctuation errors.
- Build a table of running times for n=1 through 40.
- Add columns for theoretical complexities, `log(n)`, `n`, `n^2`, and `2^n`.
- Make a graph of the running times. The x-axis should be n and the y-axis should be the number of seconds to calculate the number. Use log scale on the y-axis. If the run times do not produce a relatively smooth graph, you may need to improve your error elimination techniques.
- Save the table in `fib1-table.pdf`.

Programming Assignment `fib2`

- Implement `fib2` from the textbook.
- Experimentally determine the running time of the `fib2`. Use best practices for eliminating granularity and fluctuation errors.
- Add a column to the table of running times for `fib2`.
- Normalize the `fib1`, `fib2` running times, and theoretical complexities for comparison.
- Make the graph use the normalized values.
- Save the table in `fib1-fib2-graph.pdf`.

Submission

- Submit you solutions by the due date and time. For written problems, your work and answers as a PDF to Canvas. For code, submit the source code and required files to the class git repository.