

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 your 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.