

## COMP 304 Assignment 0

This assignment is not required but may be useful for those of you wondering what type of mathematics will be expected from you in the course. Most of these things (not all) you should have seen before in some course or other. If you are comfortable with the majority of the questions then you should have no problems with the mathematics in this course.

### Reading

Cormen, Leiserson, Rivest and Stein, Section 3.2, Appendix A, Appendix B.1-3.

### Practice

1. Fibonacci numbers are defined by the following recurrence:  $f_0 = 0, f_1 = 1, f_n = f_{n-1} + f_{n-2}$ . Prove by induction that  $f_n \geq (\frac{3}{2})^n$  for sufficiently large  $n$ .
2. CLRS, A.1-1
3. CLRS, B.2-3
4. CLRS, B.3-2
5. Consider the following game: An odd number of white balls and any number of black balls are put in a bag. An infinite supply of black balls is available. A step consists of removing two balls from the bag and applying the following rule: If the balls are the same color, they are both thrown away and a new black ball is placed in the bag. If the balls are of different colors, the white one is returned to the bag and the black one is discarded. Show that the game eventually terminates with a single white ball in the bag.