CE204 Lab 5: Sorting

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Week 21, 2020–21

The lab exercises are not assessed and you are not required to complete all of them, though I recommend that you attempt them all. Feel free to work with others and talk about your answers.

Solutions will be released on Moodle, on the Friday after the labs.

1 Mergesort for arrays

Write a version of mergesort for arrays. This won't be an in-place sort: you'll need to allocate new arrays for the result of the split phase. Note that it doesn't matter how you split the array, as long as you split it evenly.

2 Insertion sort

Insertion sort is described on slides 159–160. Implement it for lists and arrays.

3 Duplicates in arrays

Design an algorithm that computes the number of distinct numbers in an n-element array in time $O(n \log n)$. (Hint: the lab is about sorting.)

4 Finding pairs with a given sum

Consider the following problem. You are given an array of n `int`s and a target integer t. Does the array contain two integers whose sum is t?

a) Design an algorithm that solves this problem in time $O(n^2)$.

b) Design an algorithm that solves it in time $O(n \log n)$.