1.2-1

Give an example of an application that requires algorithmic content at the application level, and discuss the function of the algorithms involved.

Search engines require very efficient algorithms to be able to retrive related data from the large data available on internet.

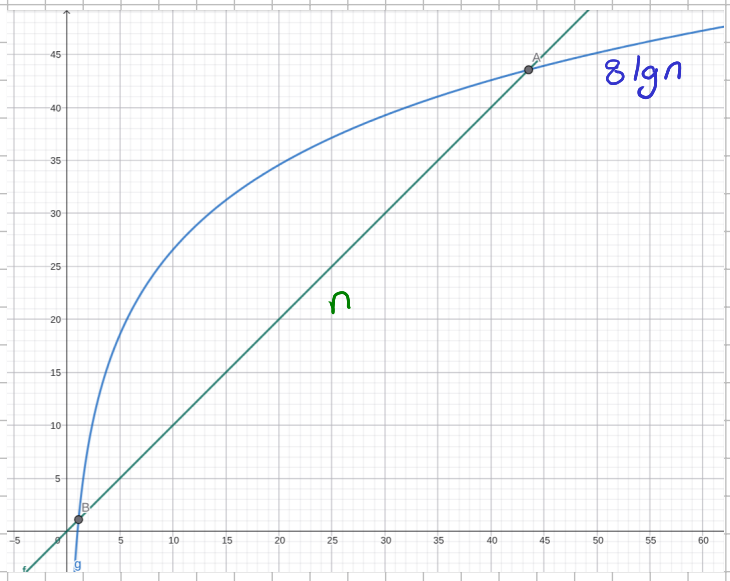
1.2-2

Suppose that for inputs of size n on a particular computer, insertion sort runs in $8n^2$ steps and merge sort runs in $64\,n \lg n$ steps. For which values of n does insertion sort beat merge sort?

$8n^2 < 64\,n \lg n$

$n < 8 \lg n$

by drawing their graphs, we find that insertion sort is better than merge sort for $1 \leq n \leq 43$



1.2-3

What is the smallest value of n such that an algorithm whose running time is $100n^2$ runs faster than an algorithm whose running time is 2^n on the same machine?

by drawing their graphs,
smallest $n \approx 0.1$