*UNBC* Homework Assignment
Computer Science 200—Winter 2024

# Chapter 2 Practice Questions

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## Due Date:

This assignment is due through by Monday, 2024-01-22 by the beginning of class.

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## From Chapter 2 of *Weiss*

Submit complete solutions of the following problems through `learn.unbc.ca`.

- Do Problem 2.1

  Order the following functions by growth rate: $n$, $\sqrt{n}$, $n^{1.5}$, $n^2$, $n \log n$, $n \log(\log n)$, $n(\log n)^2$, $n \log(n^2)$, $2/n$, $2^n$, $2^{n/2}$, 37, $n^2 \log n$, $n^3$. (Functions slightly rewritten from text for clarity)

- Do Problem 2.11

  An algorithm takes 0.5 ms for input size 100. How long will it take for input size 500 if the running time is the following (assume low-order terms are neglible)?

  a. linear
  b. $\Theta(n \log n)$ (Weiss says $O(n \log n)$, but he means $\Theta(n \log n)$. See my September 13 lecture notes on big O.)
  c. quadratic
  d. cubic

- Do Problem 2.12

  An algorithm takes 0.5 ms for input size 100. How large a problem can be solved in 60 s if the running time is the following (assume low-order terms are neglible)?

  a. linear
  b. $\Theta(n \log n)$ (you'll need to guestimate.)

c. quadratic
d. cubic

- Do Problem 2.25

  Programs A and B are analysed and found to have worst-case running times that are no graater than $150n \log n$ and $n^2$ respectively. Answer the following questions if possible:

  a. Which program has the better guarantee on running times for large values of $n$ $n > 10\,000$?
  b. Which program has the better guarantee on running times for small values of $n$ $n < 100$?
  c. Which program will run faster *on average* for $n = 1000$ ?
  d. Is it possible that Program B will run faster than Program A on all possible inputs?