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CPS 688 Lab 1

Q1

a. for computing sum of n numbers
  i) the natural size metric for inputs is n
  ii) adding every number up to n or add every 2 number
  iii) it cannot be different from the input size

b) computing n!
  i) the natural size metric is n for input
  ii) mutiply every number until its n input or multiply 2 number
  iii) it can't be different

c) Finding the largest element in a list of n numbers
  i) the natural size metric is n for inputs
  ii) comparing 2 numbers
  iii) it cannot be different for inputs

Q2

a) $n(n+1)$ is the same order of growth as $2000n^2$ $\quad n^2 \quad n^2 = n^2$

b) $100n^2$ has a smaller order of growth than $0.01n^3$ $\quad n^2 < n^3$

c) $\log_2 n$ has the same order of growth than $\ln n$ $\quad \log_2 \log n \quad \log_e \log n$

d) $(\log_2 n)^2$ has larger order of growth than $2\log_2 n$

e) 2^{n-1} has the same order of growth as 2^n

FIVE STAR.

f) $(n-1)!$ has a smaller order of growth as $n!$

Q3
from lowest to highest
1. $5 \lg(n+1000)^{10}$
2. $\ln^2 n$
3. $\sqrt[3]{n}$
4. $0.001n^4 + 3n^3 + 1$
5. 3^n
6. 2^{2n} or 4^n
7. $(n-2)!$

Q4
a) This algorithm compute the range of a given set of numbers. It take the largest number and subtracts it with the smaller number

b) The basic operation for this algorithm is the comparison of numbers.

c) At least you have 2 number, at n you have $2(n-1)$ comparisons

d) Since this algorithm does comparison, it's efficiency is $O(n)$.

e) You can do
   if A[i] < minval
      minval ← A[i]
   else A[i] > maxval
      maxval ← A[i]

this alagorithm works fine however it has $O(n)$.