University of Waterloo
CS240R Fall 2017
Tutorial 1

Monday, September 18

Problem 1 - Order Notation

Prove the following order notations using first principles:

a) $\log(n!) \in \Theta(n \log n)$,

b) $2^{\log^2 n} \in \omega(n)$.

Problem 2 - Proof/Disproof

Prove or disprove the following statement: If $f(n) \in O(g(n))$ and $g(n) \in \Omega(h(n))$, then $f(n) \in \Omega(g(n))$.

Problem 3 - Loop Analysis

Analyze the following piece of pseudocode and give a tight (Θ) bound on the running time as a function of n.

```
acc := 1
for (i = 1; i < sqrt(n); i++)
  for (j = 0; j < n; j = j + i)
    acc = 3 * acc
return acc
```