CS170–Spring 2015 — Solutions to Homework 1

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1. Getting started

I, Kevin Chau, understand the course policies.

2. Compare growth rates

(a) f(n)=$\omega(g(n))$

(b) YOUR ANSWER GOES HERE

(c) YOUR ANSWER GOES HERE

(d) YOUR ANSWER GOES HERE

(e) YOUR ANSWER GOES HERE

(f) YOUR ANSWER GOES HERE

(g) YOUR ANSWER GOES HERE

(h) YOUR ANSWER GOES HERE

(i) YOUR ANSWER GOES HERE

(j) YOUR ANSWER GOES HERE

3.

YOUR ANSWER GOES HERE

4.

YOUR ANSWER GOES HERE

5.

(a) From here we must show that $n\hat{n} = O(n!\hat{c})$. We can do this by induction. To show that the base case works, we notice that $c \geq 2, otherwise there is no n which could satisfy n\hat{n} < n!. The smallest numbers can 2 and n = 3 (3\hat{3} = 27 < 3!\hat{2} = 36). Next we make the inductive hypothesis n\hat{n} < n!\hat{c}. Now for the induction : (n+1)\hat{(n+1)} = (n+1)(n+1)\hat{n} < (n+1)(n\hat{(n+1)}) = (n+1) * n * n\hat{n} < (n+1) * n * (n!\hat{c}), where we used the hypothesis is in the last inequality. Next notice that (n+1) * n * (n!\hat{c}) < (n+1)(n+1)(n!\hat{c}) \leq ((n+1)\hat{c}) * (n!\hat{c}), where again we must have c \geq 2 for the last inequality to hold. But ((n+1)\hat{c}) * (n!\hat{c}) = (n+1)!\hat{c}, thus we have shown (n+1)\hat{(n+1)} < (n+1)!\hat{c} which proves that the claim holds for all n.$

6.

(a) YOUR ANSWER GOES HERE

(b) YOUR ANSWER GOES HERE

(c) YOUR ANSWER GOES HERE

7.

YOUR ANSWER GOES HERE