CS 135 2015 – Homework 6

1. Read 5.1 and read LS chapter 3.

2. Do 5.1 exercises 4, 20.

3. Define a Scheme function `expo` so that `(expo n i)` is n^i for natural numbers n and i. Use the standard definition

$$n^0 = 1 \quad \text{and} \quad n^i = n * n^{i-1} \quad \text{for all } i > 0$$

4. Using the standard definition, prove that

$$n^i * n^j = n^{i+j}$$

   for all natural numbers i, j, n.

   Hints: The exponent function is defined recursively so we need to reason by induction. The equation involves three numbers, but the recursive calls are for the exponent, which suggests that the induction should be on i and/or on j. It turns out that you can do it by induction on i. What does that mean? It means to prove $\forall i\ P(i)$ where $P(i)$ is $\forall j, n\ (n^i * n^j = n^{i+j})$.