CS 240: Data Structures and Data Management **Spring 2023**

Tutorial 01: May 15

This tutorial focuses on proofs by first principles.

1. **Θ-notation**

   Prove from first principles that $n^3 \in \Theta(4n^3 - 3n^2 + 2n - 1)$.

2. **Little-o**

   Prove from first principles that $\frac{1}{n} \in o(1)$.

3. **Fraction between two Θ-notations**

   Prove or disprove the following statement: If $T_1(n) \in \Theta(f(n))$ and $T_2(n) \in \Theta(g(n))$, then $\frac{T_1(n)}{T_2(n)} \in \Theta\left(\frac{f(n)}{g(n)}\right)$. $T_1(n), T_2(n), f(n), g(n)$ are all positive for all $n > 0$.