CS 240: Data Structures and Data Management **Fall 2024**

Tutorial 02: September 20

1. **More Θ-Notation**
   Prove from first principles that $\log(n!) \in \Theta(n \log(n))$

2. **Loop Analysis - Iteration**
   Provide a tight Θ bound on the following pseudocode as a function of n:

Algorithm 1: Iterative Pseudocode

```
k ← 1
for i from 1 to n do
    j ← 0
    while j ≤ n do
        j ← j + k
    end
    k ← 2k
end
```

3. **Max-Heap Operations**
   Insert 27 and 9 into the following heap, and then perform a delete-max operation on the resulting heap.