Worksheet 3: Asymptotic Analysis

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2 Functions/Orders of Growth for Code

1. Finding maximum in a list

$$\Omega(n) \leq \Theta(n) \leq O(n)$$

Justification: Because the loop must iterate at least once through all the elements in the list to find the maximum, the lower bound is $\Omega(n)$, and the highest possible time complexity is $O(n)$.

2. "Median of three" computation:

$$\Omega(1) \leq \Theta(1) \leq O(1)$$

Justification: The function only compares three values and returns the median of the three. This is a constant time operation, so the time complexity is $O(1)$.

3. Counting inversions:

$$\Omega(n) \leq \Theta(n \log n) \leq O(n^2)$$

Justification: The lower bound is $\Omega(n)$ assuming that all first element of index j satisfies the if statement. The upper bound is $O(n^2)$ because element at index j may not satisfy the if statement until the last element.