Chapter 1 and 2

1. (3) Show using definition of \( \Theta \) that \( \frac{1}{2}n^2 - 5n = \Theta(n^2) \)

2. (5) For the following pair of functions indicate whether \( f(n) \) is \( O, \Omega, \Theta \) of \( g(n) \):

\[
\begin{align*}
n^k, c^n \\
2^n, 2^{n/2} \\
n^2, n \log^2 n
\end{align*}
\]

3. (4) Chapter 1, Problem 1, Problem 2

4. (5) Chapter 2, Problem 1 c, d

5. (5) Chapter 2, Problem 2 c, e

6. (5) Consider sorting \( n \) numbers stored in an array \( A \) by first selecting the smallest element and exchanging it with \( A[1] \). The finding a second smallest element and exchanging it with \( A[2] \), an continue for the first (\( n-1 \)) elements in the array. Write pseudocode for this algorithm and give the best case and worst-case running time.

Practice Problems (not for grade)

1. Chapter 1, Problem 4

2. Chapter 2, Problem 3