Section 6.1

9. Illustrate algorithm 6.8 in the book for \( k = 11 \) and \( s : 9, 10, 14, 11 \).

11. Write an algorithm that determines whether a sequence \( s : a_1, a_2, \ldots, a_n \) of \( n \) numbers contains any negative numbers.

Section 6.2

1. For function \( f : \mathbb{N} \rightarrow \mathbb{R}^+ \) and \( g : \mathbb{N} \rightarrow \mathbb{R}^+ \), \( f = O(g) \) if there is a positive constant \( C \) and a positive integer \( k \) such that \( f(n) \leq Cg(n) \) for every integer \( n \geq k \). Show that there is a positive constant \( C' \) such that \( f(n) \leq C'g(n) \) for every positive integer \( n \).

3. Let \( f : \mathbb{N} \rightarrow \mathbb{R}^+ \) and \( g : \mathbb{N} \rightarrow \mathbb{R}^+ \) be functions defined by \( f(n) = 5n + 7 \) and \( g(n) = n^2 \) for all \( n \in \mathbb{N} \). Show that \( f = O(g) \) but \( g \neq O(f) \).

7. For which of the following is \( f(n) = O(n^2) \)?
   \( \text{(a)} \) \( f(n) = 2n + 5 \)
   \( \text{(b)} \) \( f(n) = \lfloor n/2 \rfloor \)
   \( \text{(c)} \) \( f(n) = n^2 + 3n + 2 \)
   \( \text{(d)} \) \( f(n) = n \log n \)
   \( \text{(e)} \) \( f(n) = n^2 \log n \)
   \( \text{(f)} \) \( f(n) = 2^n \)

9. Let \( f : \mathbb{N} \rightarrow \mathbb{R}^+ \) and \( g : \mathbb{N} \rightarrow \mathbb{R}^+ \) be two functions defined by \( f(n) = 2n + 1 \) and \( g(n) = n \) for all \( n \in \mathbb{N} \). Show that \( f = \Theta(g) \).

11. Let \( f : \mathbb{N} \rightarrow \mathbb{R}^+ \) and \( g : \mathbb{N} \rightarrow \mathbb{R}^+ \) be functions defined by \( f(n) = n^2 + 4n + 1 \) and \( g(n) = n^2 + 4 \) for all \( n \in \mathbb{N} \). Show that \( f = \Theta(g) \).

15. Let \( f \) and \( g \) be two functions defined by \( f(n) = \frac{1}{2}n^2 + 5n + 1 \) and \( g(n) = 2n^2 + 3 \). Show that \( f(n) = \Theta(g(n)) \).