1. Consider the code to find the nth smallest element in a sequence in the sorting slides. Write pseudocode for an nth largest function. (Hint: you can use the *smallest* function to write your *largest* function)

2. Write pseudocode for a function called *median* that uses the *partition* function to find the median of an array.

3. Consider the following array that represents a heap H:

$$H = \begin{bmatrix} @, & 4, & 5, & 6, & 8, & 8, & @, & @, & @, & @ \end{bmatrix}$$

   where @ represents *NIL*

   (a) Illustrate H as a binary tree

   (b) Suppose that we insert the value a value 7 into H. Illustrate H in both its array form and as a binary tree

4. Consider the graph $G = (V, E)$ where

$$V = \{1, 2, 3\}$$

   and

$$E = \{(1, 2), (1, 3), (3, 3)\}$$

   (a) Illustrate G when G is

       i. An undirected graph

       ii. A directed graph

   (b) Give the adjacency matrix of G when G is

       i. An undirected graph

       ii. A directed graph

5. Suppose that are given an undirected graph G (that can be weighted or unweighted) stored an adjacency matrix M. You are given a sequence of vertices S. Write pseudocode that accepts M and S and determines if it is possible of visit the vertices in S in sequence.

6. Recall that the degree of a vertex is the number of edges incident to it. Write pseudocode that takes the adjacency matrix of an unweighted undirected graph M, a vertex v, and calculates the degree of vertex v.