1. State the Sorting Problem.

2. Define algorithm

3. Define space complexity of an algorithm

4. Write correct C++ code to declare an array of exactly 20 integers.

5. Write correct C++ code to sum the elements of the given array. Assume the array has been initialized. Supply declarations for all other variables that you use.

```c++
const int MONTHSPERYEAR = 12;
double electricBills2008[MONTHSPERYEAR];
```

6. Suppose you have available an implementation of a function that takes as input an array and the size of the array and returns the maximum value in the array, as given by the following declaration:

```c++
double MAX(int ARRSIZE, double ARRAY);
```

Write correct C++ code to call that function on the array given in problem 5.

7. Write correct C++ code to define, or implement, a function that accepts two integers, a and b, and returns the larger of the two in a parameter called max and the smaller of the two in a parameter called min. The function should have four parameters and have a return type void.

8. Consider the following algorithm for binary search, as applied to the given array of size seven, using a key = 9:

```c++
bsearch(list, numElems, val)
1. found ← false;
2. first ← 0;
3. last ← numElems-1;
4. middle ← -1;
5. position ← -1;
6. while (found == false and first ≤ last ) do
   7. middle ← (first + last)/2;
   8. if (list[middle] == val)
      9. then
         10. found ← true;
         11. position ← middle;
      12. else if (list[middle] > val)
         13. then
             14. last ← middle -1
         15. else
             16. first ← middle +1
      17. return position
```

Array, indexed from 0 to 6:

```
[4  7  9  11 23 28 31]
```

At the beginning of each iteration of the while loop, show the content of each of the following variables:

<table>
<thead>
<tr>
<th>iteration#</th>
<th>found</th>
<th>first</th>
<th>last</th>
<th>middle</th>
<th>position</th>
</tr>
</thead>
</table>