# Laboratory 11: Cover Sheet

Name: Ernest Landrito Date 11/18/2013

Section: 1

Place a check mark in the *Assigned* column next to the exercises your instructor has assigned to you. Attach this cover sheet to the front of the packet of materials you submit following the laboratory.

| **Activities** | **Assigned:** Check or list exercise numbers | **Completed** |
|---|---|---|
| Implementation Testing | ✓ | |
| Programming Exercise 1 | ✓ | |
| Programming Exercise 2 | | |
| Programming Exercise 3 | ✓ | |
| Analysis Exercise 1 | ✓ | |
| Analysis Exercise 2 | ✓ | |
| | Total | |

# Laboratory 11: Implementation Testing

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Section: 1

Check with your instructor whether you are to complete this exercise prior to your lab period or during lab.

| **Test Plan 11-1 (Heap ADT operations)** | | | |
|---|---|---|---|
| **Test case** | **Commands** | **Expected result** | **Checked** |
| +3+2+1 --- | Insert Remove | Inserted three<br>Removed three<br>Empty list | |

# Laboratory 11: Programming Exercise 1

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Section: 1

| Test Plan 11-2 (Priority Queue simulation results) | | |
|---|---|---|
| **Time (minutes)** | **Longest wait for any low priority (0) task** | **Longest wait for any high priority (1) task** |
| 10 | 1 | 4 |
| 30 | 2 | 8 |
| 60 | 2 | 8 |

**Question 1:** Is your priority queue task scheduler unfair—that is, given two tasks $T_1$ and $T_2$ of the same priority, where task $T_1$ is enqueued at time $N$ and task $T_2$ is enqueued at time $N + i$ ($i > 0$), is task $T_2$ ever dequeued before task $T_1$?
The scheduler is fair because the insert will only switch up if the compare condition is met not if it is equal.

**Question 2:** If so, how can you eliminate this problem and make your task scheduler fair?

## Laboratory 11: Programming Exercise 2

Name _____ Date _____

Section _____

| Test Plan 11-3 (heapSort operation) | | | |
|---|---|---|---|
| **Test case** | **Array** | **Expected result** | **Checked** |
| | | | |

# Laboratory 11: Programming Exercise 3

Name: Ernest Landrito Date 11/18/2013

Section: 1

| Test Plan 11-4 (The writeLevels operation) | | | |
|---|---|---|---|
| **Test case** | **Commands** | **Expected result** | **Checked** |
| +3 +2 +1 w | Add three items print levels | 3<br>21 | |

# Laboratory 11: Analysis Exercise 1

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Section: 1

You can use a heap—or a priority queue (Programming Exercise 1)—to implement both a first-in, first-out (FIFO) queue and a stack. The trick is to use the order in which data items arrive as the basis for determining the data items' priority values.

**Part A**

How would you assign priority values to data items to produce a FIFO queue?

I would assign the priority by the time tick the value hit the heap and use a min heap.

**Part B**

How would you assign priority values to data items to produce a stack?

I would also use the time tick the value hit the heap but use a max heap.

# Laboratory 11: Analysis Exercise 2

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Section: 1

**Part A**

Given a heap containing ten data items with distinct priorities, where in the heap can the data item with the next-to-highest priority be located? Give examples to illustrate your answer.

The next to highest priority of the root will be the higher of its children. After the root the next highest priority will either be a sibling or one of its children.

For example.

The tree could look like

```
        2
3 <
        1
```

or

```
        1
3<
        2
```

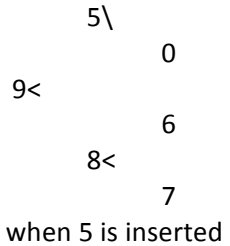
Both are acceptable heaps. But the next to highest depends specifically on the heap.

**Part B**

Given the same heap as in Part A, where in the heap can the data item with the lowest priority be located? Give examples to illustrate your answer. .
The lowest priority can be in the last two levels. It's position in the level will depend on when it is inserted into the heap. It will bubble down when a node is inserted as its child.
For example.

```
        0
 9<
                  6
        8<
                7
```

will turn into



when 5 is inserted