Laboratory 7: Cover Sheet

Name _____ Date _____

Section _____

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 7: Implementation Testing

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

Test Plan 7-1 (Queue ADT operations)			
Test case	**Commands**	**Expected result**	**Checked**
Series of enqueues	`+a +b +c +d`	`a b c d`	
Series of dequeues	`- - -`	`d`	
More enqueues	`+e +f`	`d e f`	
More dequeues	`- -`	`f`	
Empty? Full?	`E`	`False`	
	`F`	`False`	
Empty the queue	`-`	Empty queue	
Empty? Full?	`E`	`True`	
	`F`	`False`	

Note: The front data item is shown in **bold.**

Laboratory 7: Programming Exercise 1

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Use your program to simulate the flow of customers through the line and complete the following table. Note that the average wait is the combined waiting time divided by the total number of customers served.

Results Table 7-2 (customer check-out line simulation)			
Time (minutes)	Total number of customers served	Average wait	Longest wait
30			
60			
120			
480			

Laboratory 7: Programming Exercise 2

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Test Plan 7-3 (putFront and getRear operations)			
Test case	**Commands**	**Expected result**	**Checked**
Series of calls to putFront	`>a >b >c >d`	**d** c b a	
Series of calls to getRear	`= = =`	**d**	
More calls to putFront	`>e >f`	**f** e d	
More calls to getRear	`= =`	**F**	

Note: The front data item is shown in **bold**.

Laboratory 7: Programming Exercise 3

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Test Plan 7-4 (getLength operation)			
Test case	**Commands**	**Expected result**	**Checked**
Series of enqueues	`+a +b +c +d`	**a** b c d	
getLength	#	4	
Series of dequeues	– – –	**d**	
getLength	#	1	
More enqueues	`+e +f`	**d** e f	
getLength	#	3	

Note: The front data item is shown in **bold**.

Laboratory 7: Analysis Exercise 1

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Part A

Given the following memory requirements

Integer	4 bytes
Address (pointer)	4 bytes

and a queue containing one hundred integers, compare the amount of memory used by your array representation of the queue to the amount of memory used by your singly linked list representation. Assume that the array representation allows a queue to contain a maximum of one hundred data items.

Note: integer and pointer memory requirements vary depending on the operating system and compiler. Integers and addresses range in size from 2 to 8 bytes, or larger. The values above represent a specific platform and were chosen for simplicity of calculation.

Part B

Suppose that you have ten queues of integers. Of these ten queues, four are 50% full, and the remaining six are 10% full. Compare the amount of memory used by your array representation of these queues with the amount of memory used by your singly linked list representation. Assume that the array representation allows a queue to contain a maximum of one hundred data items.

Part C

Suppose that you have a large object that requires 1000 bytes of memory. Repeat the analysis from Part A using a queue of large objects. How does the large object affect the memory efficiency of the two queues?

Laboratory 7: Analysis Exercise 2

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In Programming Exercise 1, you used a queue to simulate the flow of customers through a line. Describe another application where you might use the Queue ADT. What type of information does your application store in each queue data item?