CSc 127B — Introduction to Computer Science II
Fall 2015 (McCann)

In-Class Activity #6

Name #1: _____ Section Leader: _____

Name #2: _____ Section Leader: _____

Name #3: _____ Section Leader: _____

Directions: In groups of 2 or 3, without using electronics, answer the following questions to the best of your combined abilities. When appropriate, show your work, to help us understand your thought process. ICAs (In-Class Activities) count toward your grade; please take them seriously. Week 9 (2015/10/21)

1. On Monday we learned that we have to re-think how we implement `isEmpty()` and `isFull()` in queues when using the circular array idea. Let's think about how to implement a `getOccupancy()` method that returns the number of items in the queue.

   (a) Consider the non-circular queue pictured on the right. Create an expression that uses `front` and `rear` to compute the quantity of items in the queue.

0	1	2	3	4	front	rear
		c	d		2	3

   (b) On the right are two circular queues. Apply your expression to both queues. What does your expression produce for each queue? What *should* it have produced for each queue?

0	1	2	3	4	front	rear
f		c	d	e	2	0

0	1	2	3	4	front	rear
f	g			e	4	1

   (c) You should see that the differences between the expression's results and the correct answers are the same, and equal to a characteristic of the queues. What is that characteristic?

   (d) It seems that all you have to do is add that difference to the expression to fix it. But . . . does that fix work on the non-circular queue shown with part (a)?

   (e) Create a new expression that works in both the circular and non-circular situations shown above. (HINT: Modulo is your friend.)

When your group is satisfied with your answers, or time is up, hand this to one of the class staff. We'll review the correct answers after time is up.