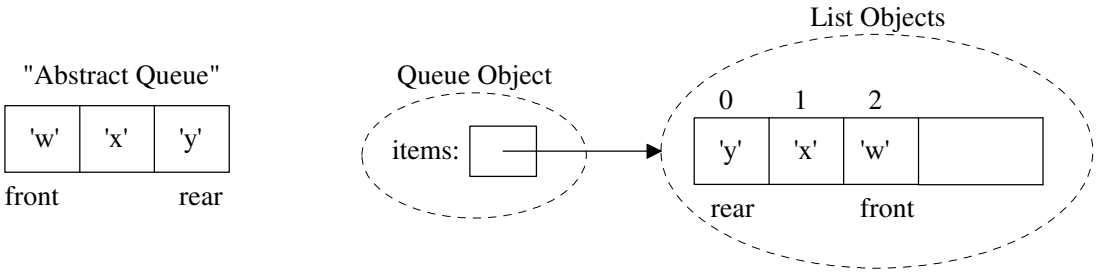
Data Structures (CS 1520) Lab 3 Name:_____

Objective: To understand FIFO (First-In-First-Out) queue implementations in Python including being able to determine the big-oh of each operation.

To start the lab: Download and unzip the file at: www.cs.uni.edu/~fienup/cs1520f13/labs/lab3.zip

Part A: The textbook's `QueueText` implementation in `lab3/queue_text.py` uses a Python list



a) Complete the big-oh notation for the above `QueueText` implementation: ("n" is the # items)

	__init__	enqueue(item)	dequeue( )	peek( )	size( )	isEmpty( )	__str__
Big-oh							

b) Explain your big-oh answer for enqueue(item).

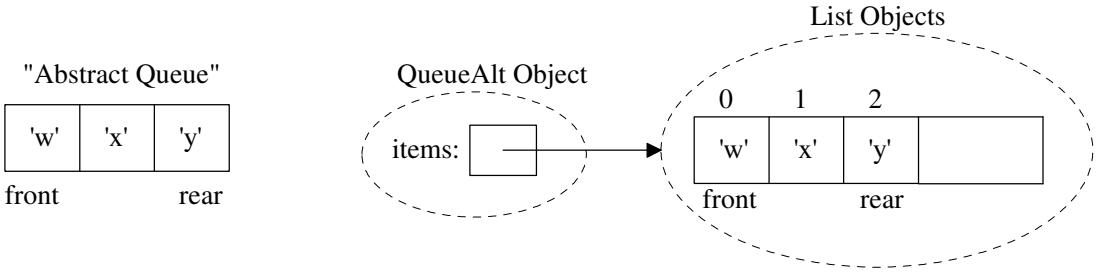
c) Explain your big-oh answer for dequeue( )

d) Run the timeQueue.py file which times 100,000 enqueues followed by 100,000 dequeues.
Time for 100,000 enqueues: Time for 100,000 dequeues:

e) Why do the enqueues take so much more time?

After answering the above questions, raise you hand and explain your answers.

Part B: Complete the `QueueAlt` implementation in `lab3/queue_alt.py` uses a Python list



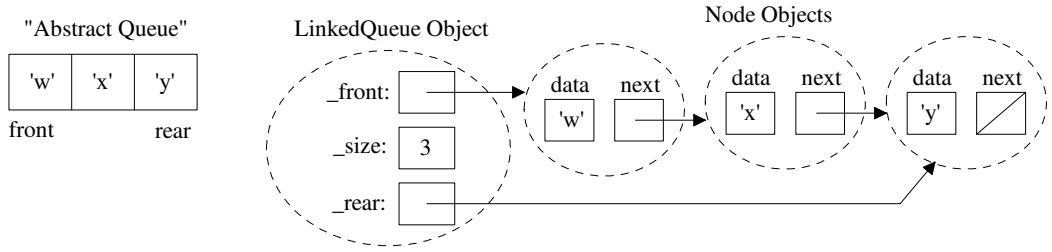
a) Complete the big-oh notation for the above `QueueAlt` implementation: ("n" is the # items)

	__init__	enqueue(item)	dequeue( )	peek( )	size( )	isEmpty( )	__str__
Big-oh							

b) Run the timeQueueAlt.py file which times 100,000 enqueues followed by 100,000 dequeues.
Time for 100,000 enqueues: Time for 100,000 dequeues:

After completing the QueueAlt class, answering the above questions, raise you hand and demonstrate your code.

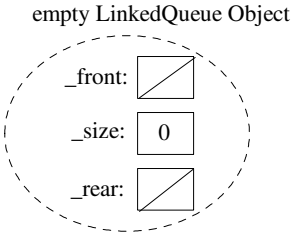
Part C: Consider the `LinkedQueue` implementation in `lab3/linked_queue.py` which uses a linked structure that looks like:



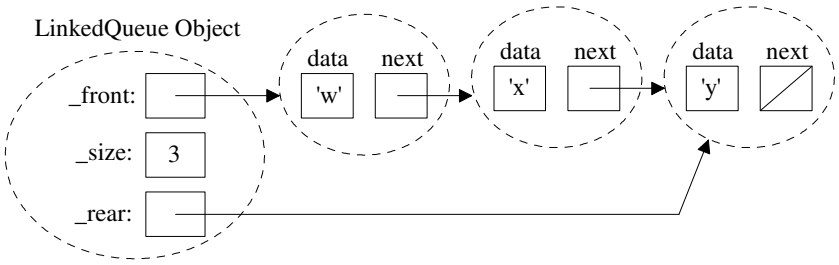
a) Draw the picture and number the steps for the `enqueue` method of the "normal" case (non-empty queue) above

b) Complete the `enqueue` method code for the "normal" case in the `lab3/linked_queue.py` file

c) Starting with the empty queue below, draw the resulting picture after your "normal" case code executes.



d) Fix your "normal" case code to handle the "special case" of an empty queue.



e) Draw the picture and number the steps for the `dequeue` method of the "normal" case (non-empty queue) above

f) Complete the `dequeue` method code for the "normal" case in the `lab3/linked_queue.py` file

g) What "special case(s)" does the `dequeue` method code need to handle?

h) Complete the big-oh notation for the `LinkedQueue` methods: ("n" is the # items)

	__init__	enqueue(item)	dequeue( )	peek( )	size( )	isEmpty( )	__str__
Big-oh							

i) Run the timeLinkedQueue.py file which times 100,000 enqueues followed by 100,000 dequeues.
Time for 100,000 enqueues: Time for 100,000 dequeues:

After thoroughly testing your linked implementation, raise you hand and demonstrate your queue.