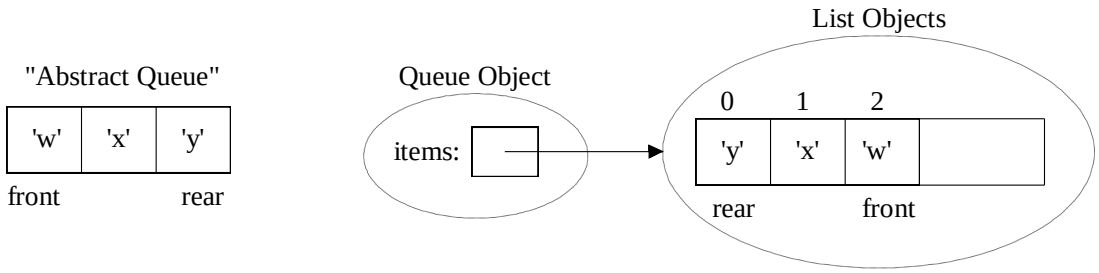
Objective: To understand FIFO (First-In-First-Out) queue implementations in Python including being able to determine the big-oh of each operation.

To start the lab: Download and unzip the lab3.zip file from eLearning

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( )

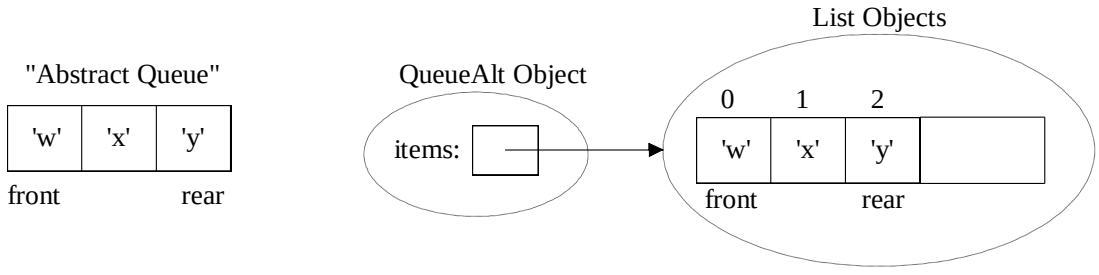
d) Run the timeQueue.py file which times 100,000 enqueues followed by 100,000 dequeues.
Time for 100,000 enqueues: Time for 100,000 dequeues:

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

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

Part B:

a) Complete the `QueueAlt` implementation in `lab3/queue_alt.py` uses a Python list

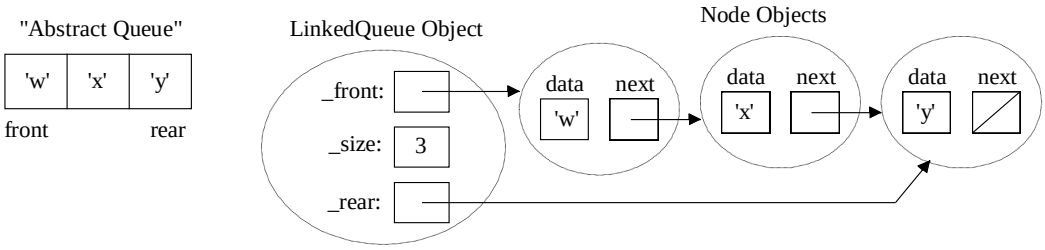


b) Complete the big-oh notation for the above `QueueAlt` implementation: ("n" is the # items)

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

c) 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:

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

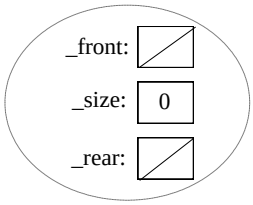


a) Modify the above picture and number the steps for the `enqueue` method's "normal" case (non-empty queue)

b) Write the "normal" case code for the `enqueue` method below.

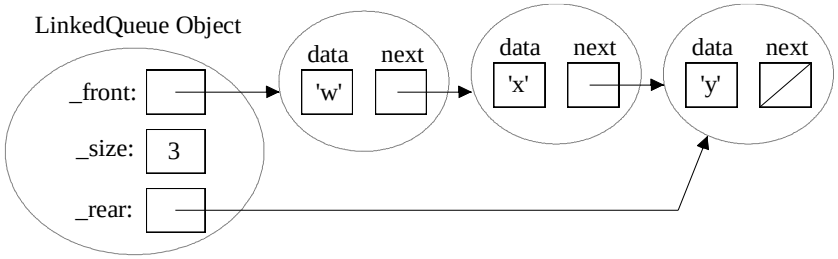
c) Starting with the empty queue below, draw the resulting picture after your "normal" case code executes.

empty LinkedQueue Object



d) **Complete the `enqueue` method code for the "normal"and special case(s) in the `lab3/linked_queue.py` file**

Consider dequeuing from the below "normal" case picture (i.e., it should remove and return 'w'):



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

f) Write the "normal" case code for the `dequeue` method below.

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

h) **Complete the `dequeue` method code for the "normal" case and special case(s) in the `lab3/linked_queue.py` file.**

i) **Complete the peek method code for the "normal" case and special case(s) in the `lab3/linked_queue.py` file.**

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

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

k) 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 you have working code, zip the lab3 folder and submit it on eLearning. (You should save a copy too.)

If you have extra time, this would be a good chance to work on Homework #2!