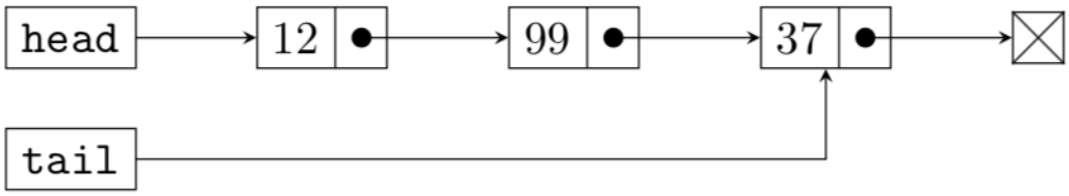
# CMPSCI 187 (Spring 2019) Lab 07: Queue

This lab reviews some topics on the midterm. To work on the assignment:

- Go to ***File -> Make a Copy*** to make an editable copy of this Google Doc for your account
- Follow the instructions to complete the assignment
- When you are done, go to ***File -> Download As -> PDF Document***
- Log in to Gradescope and submit your PDF

1. Suppose we have the following queue implemented as a linked list with head insertion.




(a) (5 points) Complete the figure below showing the contents of the queue:

Queue - FIFO

| | | | | |
|---|---|---|---|---|
| 37 | 99 | 12 | | |

---------->

(b) (5 points) How many dequeue() calls will it take before:

i. 37 is removed?

| |
|---|
| 1 |

ii. 12 is removed?

| |
|---|
| 3 |

iii. head is null?

| |
|---|
| 3 |

iv. isEmpty() returns true?

| |
|---|
| 3 |

v. a QueueUnderflowException is thrown?

| 4 |
|---|

(c) (5 points) If we insist on using head insertion, what is the O() cost of the following operations on this queue? Note that the tail reference must still be maintained.

i. dequeue()

| O( n ) |
|---|

ii. peek()

| O( 1 ) |
|---|

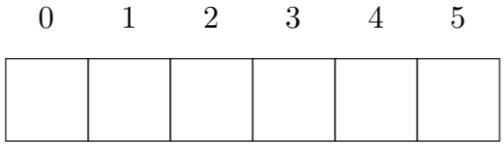
iii. enqueue()

| O( 1 ) |
|---|

2. (a) (5 points) Draw the array equivalent to the Queue created by the following operations:

```
enqueue(121);
enqueue(187);
enqueue(230);
enqueue(220);
enqueue(250);
enqueue(240);
```

Array:




0 1 2 3 4 5

| 121 | 187 | 230 | 220 | 250 | 240 |
|---|---|---|---|---|---|

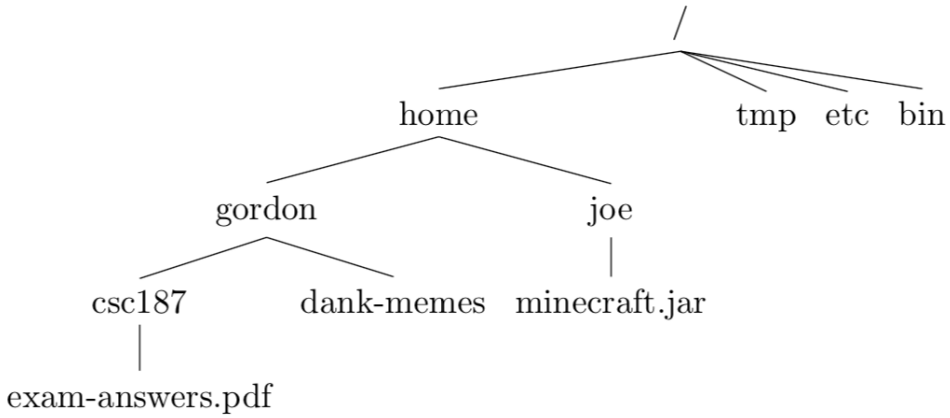
(b) (1 point) What is the O() cost of enqueue(311) after the previous code has been executed?

| O( n ) |
|---|

(c) (1 point) What would the O() cost of enqueue(311) be if we were using a linked list with tail insertion like in this week's project? Justify your answer with a diagram.

| O( 1 ) |
|---|

3. Suppose we have the following file system structure:




a) (5 points) In what order will a level order traversal visit the files? Assume files are added to the queue from left to right and all subdirectories are immediately enqueued when the parent directory is processed.

/
/home
/tmp
/etc
/bin
/home/gordon
/home/joe
/home/gordon/csc187
/home/gordon/dank-memes
/home/joe/Minecraft.jar
/home/Gordon/csc187/exam-answers.pdf

b) (5 points) Now suppose we swapped out our queue for a stack and tried to traverse the file system again. What would the stack look like immediately after minecraft.jar gets pushed?

TOP

| |
|---|
| |
| |
| |
| |
| |
| |
| |
| |
| Minecraft.jar |
| gordon |

BOTTOM