CS 101 Fall 2020 - Quiz 2-A

9/22/2020 - 20 Minutes   **Name:**   **ID number:**   **Score:**

Remember that your work is graded on the quality of your writing and explanation as well as the validity.

(1) (6 Points) Suppose you have a stack in which the values 1 through 5 must be pushed on the stack in that order, but that an item on the stack can be popped at any time. Give a sequence of push and pop operations such that the values are popped in the following order: (It might not be possible in each case)
  (a) 2, 4, 5, 3, 1
  (b) 1, 5, 4, 2, 3
  (b) 1, 3, 5, 4, 2

(2) (4 Points) Suppose there is an initially empty queue with capacity 7 which is implemented by an array (viewed circularly). Show the array after the following operations being operated and indicate the place of the front and back of the queue.

(1)

Enqueue(1)

Enqueue(3)

Enqueue(5)

Dequeue()

Enqueue(7)

Enqueue(9)

Enqueue(1)

Dequeue()

Enqueue(3)

Enqueue(5)

Enqueue(7)

Dequeue()

———————————————————

(2)

Enqueue(1)

Enqueue(2)

Enqueue(7)

Enqueue(6)

Enqueue(5)

Dequeue()

Enqueue(1)

Enqueue(3)

Enqueue(5)

Dequeue()

Dequeue()

Dequeue()

Enqueue(6)

Enqueue(7)

Enqueue(8)

Dequeue()

Dequeue()

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(3) (10') Order the following functions so that for all i, j, if f_i comes before f_j in the order then $f_i = O(f_j)$.

Do **NOT** justify your answers.

- $f_1(n) = 3^n$
- $f_2(n) = n^{\frac{1}{3}}$
- $f_3(n) = 12$
- $f_4(n) = 2^{\log_2 n}$
- $f_5(n) = \sqrt{n}$
- $f_6(n) = 2^n$
- $f_7(n) = \log_2 n$
- $f_8(n) = 2^{\sqrt{n}}$
- $f_9(n) = n^3$
- $f_{10}(n) = n!$

As an answer you may just write the functions as a list, e.g. $f_8, f_9, f_1, \cdots$