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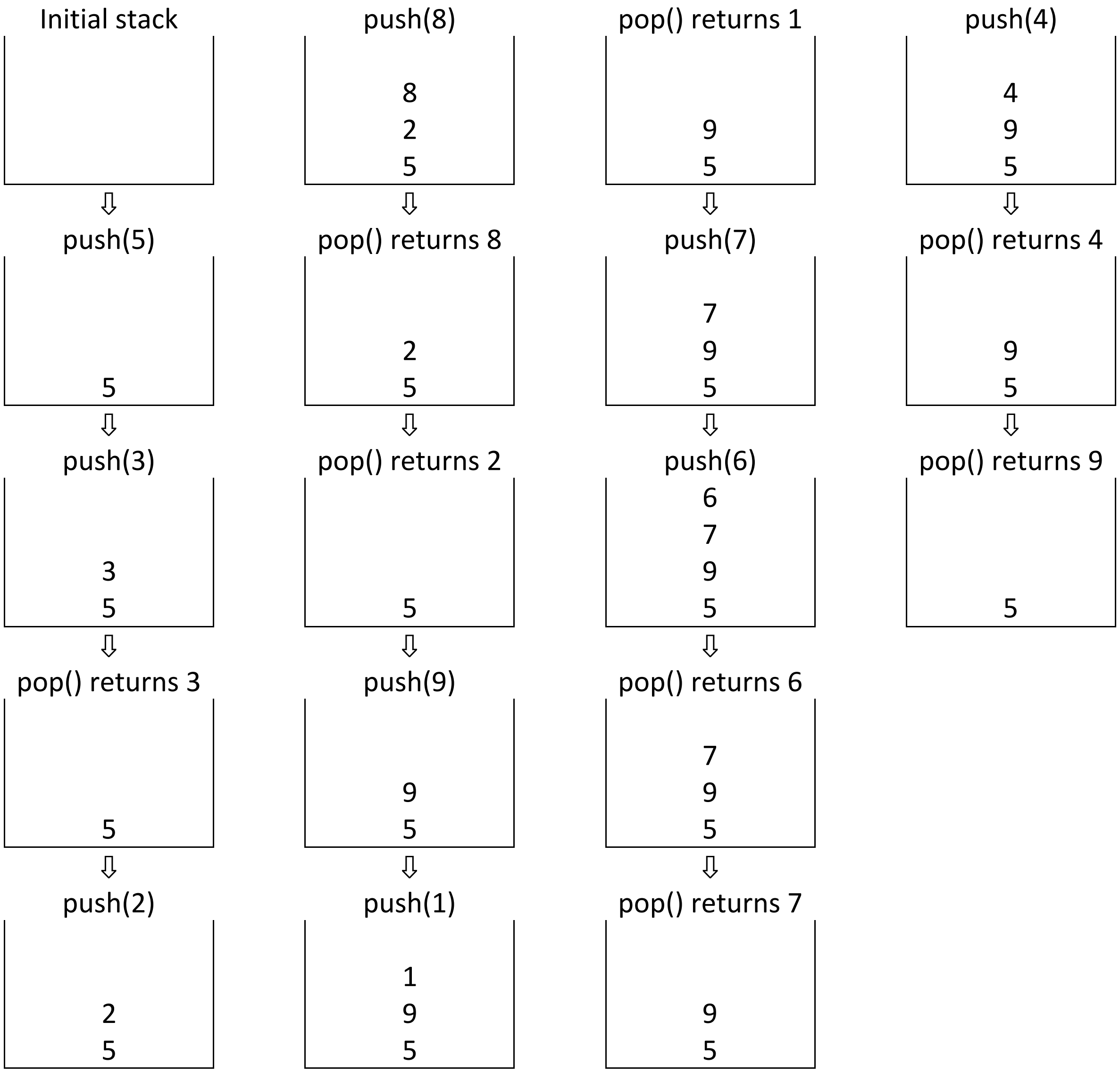
## COP3410- Assignment 6
## Ch6. Stacks, Queues, and Deques

R-6.1 What values are returned during the following series of stack operations, if executed upon an initially empty stack? push(5), push(3), pop(), push(2), push(8), pop(), pop(), push(9), push(1), pop(), push(7), push(6), pop(), pop(), push(4), pop(), pop().



Note: Push operations do not return any values, they just change the stack

R-6.2 Suppose an initially empty stack S has executed a total of 25 push operations, 12 top operations, and 10 pop operations, 3 of which raised Empty errors that were caught and ignored. What is the current size of S?

Operations	Changes in len(S)
25 elements pushed	+25
12 elements topped	+/- 0
10 – 3* = 7 elements popped	-7
Total elements remaining in S	18

* if errors appear, there is no element popped because the list is empty

R-6.3 Implement a function with signature transfer(S, T) that transfers all elements from stack S onto stack T, so that the element that starts at the top of S is the first to be inserted onto T, and the element at the bottom of S ends up at the top of T.

```
def transfer(S, T):
    for i in range(len(S)):
        element = S.pop()
        T.push(element)
    return T
```

R-6.7 What values are returned during the following sequence of queue operations, if executed on an initially empty queue? enqueue(5), enqueue(3), dequeue(), enqueue(2), enqueue(8), dequeue(), dequeue(), enqueue(9), enqueue(1), dequeue(), enqueue(7), enqueue(6), dequeue(), dequeue(), enqueue(4), dequeue(), dequeue().

Operation	Return Value	First <- Q <- Last
Initial queue	-	[]
enqueue(5)	-	[5]
enqueue(3)	-	[5, 3]
dequeue()	5	[3]
enqueue(2)	-	[3, 2]
enqueue(8)	-	[3, 2, 8]
dequeue()	3	[2, 8]
dequeue()	2	[8]
enqueue(9)	-	[8, 9]

Operation	Return Value	First <- Q <- Last
enqueue(1)	-	[8, 9, 1]
dequeue()	8	[9, 1]
enqueue(7)	-	[9, 1, 7]
enqueue(6)	-	[9, 1, 7, 6]
dequeue()	9	[1, 7, 6]
dequeue()	1	[7, 6]
enqueue(4)	-	[7, 6, 4]
dequeue()	7	[6, 4]
dequeue()	6	[4]

R-6.8 Suppose an initially empty queue Q has executed a total of 32 enqueue operations, 10 first operations, and 15 dequeue operations, 5 of which raised Empty errors that were caught and ignored. What is the current size of Q?

Operations	Changes in len(S)
32 enqueue	+32
10 first	+/- 0
15-5* = 10 dequeue	-10
Total elements remaining in Q	22

* if errors appear, there is no element dequeued because the list is empty

R-6.9 Had the queue of the previous problem been an instance of ArrayQueue that used an initial array of capacity 30, and had its size never been greater than 30, what would be the final value of the front instance variable?

Operations	Changes in self._front
Start (self._front == 0)	30 spaces
32 enqueue	+/- 0
10 first	+/- 0
15-5 = 10 dequeue	+10
Times the front has changed	10

self._front only increments when a dequeue takes place so the final value would be 10 ahead of its initial value