Full Name: _____

AID: _____

CS 331 Midterm Exam Worksheet

WP1 (/6) :	
WP2 (/6) :	
WP3 (/8) :	
TOTAL (/20) :	

Stacks

WP1

```python
class Stack:
    class Node:
        def __init__(self, val, next):
            self.val = val
            self.next = next

    def __init__(self):
        self.top = None

    def push(self, val):
        self.top = Stack.Node(val, self.top)

    def pop(self):
        assert(self.top is not None)
        val = self.top.val
        self.top = self.top.next
        return val

    def roll(self, n):
        p = self.top
        for _ in range(n-1):
            p = p.next
        self.top.next, self.top, p.next = p.next, self.top.next, self.top
```

Linked Lists
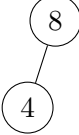
WP2
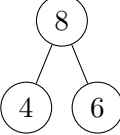
```
class LinkedList
    class Node:
        def __init__(self, val, prior=None, next=None):
            self.val = val
            self.prior = prior
            self.next  = next

    def __init__(self):
        self.head = LinkedList.Node(None)
        self.head.prior = self.head.next = self.head
        self.length = 0

    def guided_iter(self, steps):
        n = self.head.next
        for s in steps:
            if s > 0:
                for _ in range(s):
                    n = n.next
                    if n == self.head:
                        n = n.next
            else:
                for _ in range(-s):
                    n = n.prior
                    if n == self.head:
                        n = n.prior
            yield n.val
```
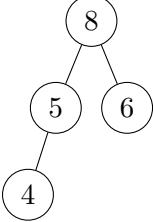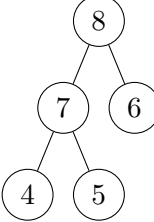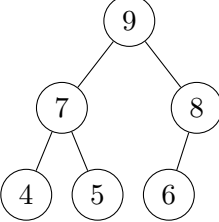
Heaps

WP3 (a)

(a) After adding 4	(b) After adding 8	(c) After adding 6
4	8 4	8 4 6

(d) After adding 5	(e) After adding 7	(f) After adding 9
8 5 6 4	8 7 6 4 5	9 7 8 4 5 6

WP1 (b)

`third_largest` fails on:
6 5 3 4