DATA-Lab3

Question 5:

The Big-O notation of each functions are listed in the table 1. For more details, please check Python scripts.

Table 1

Aa Name	≡ Array	≡ Singly linked list
emptyStack()	O(1)	O(1)
push()	O(1)	O(1)
pop()	O(1)	O(1)
peek()	O(1)	O(1)
enqueue()	O(1)	O(1)
dequeue()	O(1)	O(n)

The results of all attempts below showed that no p value is smaller than 0.05, which means that H0 of those tests could not be rejected.

Then, I came to the following conclusion:

- For **Stack**, there is no significant difference in runtime (efficiency) when implementing four functions of stack (**emptyStack(), push(), pop(), peek()**) with array and singly linked list.

- For **Queue**, there is no significant difference in runtime (efficiency) when implementing **enqueue()** functions of queue with array and singly linked list. However, implementing **dequeue()** function with array is more efficient than implementing queue with singly link list.

Result from ex5_comparative_test.py

```
Attempt no.1:
        p_value_emptyStack: 0.1328
        p_value_push: 0.7053
        p_value_pop: 0.0536
        p_value_peek: 0.4146
        p_value_enqueue: 0.4429
        p_value_dequeue: 0.7064
Attempt no.2:
        p_value_emptyStack: 0.2418
        p_value_push: 0.4185
```

```
                p_value_pop: 0.2078
                p_value_peek: 0.6671
                p_value_enqueue: 0.5318
                p_value_dequeue: 0.735
    Attempt no.3:
                p_value_emptyStack: 0.8103
                p_value_push: 0.9928
                p_value_pop: 0.3913
                p_value_peek: 0.3861
                p_value_enqueue: 0.8529
                p_value_dequeue: 0.6111
    Attempt no.4:
                p_value_emptyStack: 0.3257
                p_value_push: 0.7127
                p_value_pop: 0.2831
                p_value_peek: 0.9051
                p_value_enqueue: 0.4025
                p_value_dequeue: 0.791
    Attempt no.5:
                p_value_emptyStack: 0.3014
                p_value_push: 0.1099
                p_value_pop: 0.1736
                p_value_peek: 0.3808
                p_value_enqueue: 0.3863
                p_value_dequeue: 0.8999
```