Assignment 6

On the last day of the semester this assignment is due.

Due on: 2021-12-01, 23:59:59

Part A: Evaluate the performance of your algorithm in terms of time and space complexity.

1. Analyze the Time Complexity
   - Explain why the complexity is O(n^2)
   - How does this complexity affect the performance of the algorithm?

2. Analyze the Space Complexity
   - Calculate the space complexity of your algorithm
   - Discuss any optimizations that can be made to reduce space complexity

Part B: Debugging

Debug the following code snippet to fix the logic errors.

```python
def calculate_sum(numbers):
    total = 0
    for num in numbers:
        total += num
    return total

print(calculate_sum([1, 2, 3, 4]))
```

Part C: Implementation

Implement the following data structure with the given operations.

1. Stack
   - Implement a stack using a list
   - Implement operations like push, pop, and check if empty

2. Queue
   - Implement a queue using a list
   - Implement operations like enqueue, dequeue, and check if empty

Part D: Complete the following question.

1. What is the time complexity of sorting an array of size n using quicksort?
   - Explain your answer

Part E: Discuss the advantages and disadvantages of using a linked list over an array.

Discussion:

- Advantages of a linked list
- Disadvantages of a linked list

Part F: Experiment with a given dataset using your algorithm.

- Describe the dataset
- Evaluate the performance of your algorithm on the dataset

Conclusion:

- Summarize your findings
- Suggest possible improvements or future work