Q1
7 Points

In the notes, you learnt that the correctness of an algorithm is very critical in determining that the output given is always reliable. In algorithms we determine the correctness of an algorithm by providing a **loop invariant** . A loop invariant is a condition that is true before the beginning of an algorithm execution, is true during the execution and is also true at the end of the execution. For this question, consider the Linear Search algorithm whose function is given below

```python
def linearSearch(myList, item):
    for items in myList:
        if (item == items):
            print("Found")
```

Q1.1 Loop invariant
2 Points

Determining the loop invariant for linear search.

For each item in myList, where item does not equal to the item that for the current value of the loop iteration variable.

Q1.2
5 Points

Show the Correctness proof for linear search algorithm determining the correctness of the loop invariant at initialization (before the execution), maintenance (during the execution) and termination (after the execution).

▼ Q1.2.pdf   ⬇ Download

1 / 1 — + ⟲

Q2 True / False
5 Points

Determine whether the following statements are True or False. Note that you do not need to provide the solution; a direct answer is sufficient

Q2.1
1 Point

$$10n^2 + 20n + 30 = O(n^2)$$

◉ `True`

○ `False`

Q2.2
1 Point

$$5000n^3 + 5000 = O(n^4)$$

◉ `True`

○ `False`

Q2.3
1 Point

$$4^n = O(2^n)$$

○ `True`

◉ `False`

Q2.4
1 Point

$$4^n = O(n!)$$

◉ `True`

○ `False`

Q2.5
1 Point

$$n^{1000} = O(2^n)$$

○

◉ `True`

○ `False`

Q3
3 Points

Given the following running times, arrange them in the order from **slowest** to the **fastest**

1. Quadratic $\quad O(n^2)$
2. Constant $\quad O(1)$
3. Polynomial $\quad O(n^{1000})$
4. Logarithmic $\quad O(logn)$
5. Linear $\quad O(n)$
6. Exponential $\quad O(2^n)$
7. Linearithmic $\quad O(nlogn)$

Your answer should be in this format: 1,2,4,5,6,7 etc. For auto grader to work, do not make spaces between the numbering.

NOTE: NO PARTIAL CREDIT FOR THIS QUESTION

6,3,1,7,5,4,2

Quiz 0 - Asymptotic

● GRADED

STUDENT

Kejian Tong

TOTAL POINTS

14 / 15 pts

QUESTION 1

(no title)

6 / 7 pts

1.1   Loop invariant

1 / 2 pts

1.2	(no title)	**5** / 5 pts

QUESTION 2

True / False		**5** / 5 pts
2.1	(no title)	**1** / 1 pt
2.2	(no title)	**1** / 1 pt
2.3	(no title)	**1** / 1 pt
2.4	(no title)	**1** / 1 pt
2.5	(no title)	**1** / 1 pt

QUESTION 3

(no title)	**3** / 3 pts