**Lab W1D5**

**Question 1**

|  |  |  |
| --- | --- | --- |
| Iteration | Inversions | # of inversions |
| 0 | (34,8), (34,32), (34,21), (64,51), (64,32), (64,21), (51,32), (51,21), (32,21) | 9 |
| 1 | (34, 32), (34, 21), (51, 32), (51, 21), (32, 21) | 5 |
| 2 | (34, 32), (34, 21), (32, 21) | 3 |
| 3 | (32, 21) | 1 |
| 4 | - | 0 |

Total number of inversions for Bubble Sort = 9

|  |  |  |
| --- | --- | --- |
| Iteration | Inversions | # of inversions |
| 0 | (34,8), (34,32), (34,21), (64,51), (64,32), (64,21), (51,32), (51,21), (32,21) | 9 |
| 1 | - | 0 |
| 2 | - | 0 |
| 3 | - | 0 |
| 4 | - | 0 |

Total number of inversions for Selection Sort = 9

|  |  |  |
| --- | --- | --- |
| Iteration | Inversions | # of inversions |
| 0 | (34,8), (34,32), (34,21), (64,51), (64,32), (64,21), (51,32), (51,21), (32,21) | 9 |
| 1 | - | 0 |

Total number of inversions for Insertion Sort = 9

**Question 2**

1. Instance 4 of clearable table

Total cost = 30

Number of operations = 22

Average cost per operation = 30/22 ≤ 2.

1. Instance 3 of ArrayList with size doubling strategy

Actual of add = 1

Actual cost of resize = 3k

Total cost = 16 + 96 = 112

Amortized\_Cost(add) = 112/16 = 7

Amortized\_Cost(resize) = 0

**Question 3**

Let’s have a resize just happened from size 4 to size 12.

Actual of add = 1

Actual cost of resize = 4k

Sample Instance :

Add Add Add Add Resize

1 1 1 1 4\*12

Total cost = 4 + 48 = 112

Average cost of an operation = 112/5 <=23

Amortized\_Cost(add) = 54/4 = 13

Amortized\_Cost(resize) = 0

Average cost of an operation = 112/5 <=23