Question 1

A) Bubble sort

Iteration	**inversions**	**# 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

Total number of inversions for Bubble Sort = 18

B) Selection sort

Iteration	**inversions**	**# 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), (64 51), (64 32), (64 21), (51 32), (51 21), (32 21)	8
2	(64 51), (64 32), (64 34), (51 32), (51 34)	5
3	(51 34), (64 34)	2
4	(64 51)	1

Total number of inversions for Selection Sort = 25

C) Insertion sort

Iteration	**inversions**	**# 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), (64 51), (64 32), (64 21), (51 32), (51 21), (32 21)	8
2	(34 32), (34 21), (64 51), (64 32), (64 21), (51 32), (51 21), (32 21)	8
3	(34 32), (34 21), (51 32), (51 21), (64 32), (64 21), (32 21)	7
4	(32 21), (34 21), (51 21), (64 21)	4

Total number of inversions for Insertion Sort = 36

Question 2

Item #	Operation	Cost for us	Customer paid	Profit	Balance
1	Add	We assume we start with 1 slot. We add 1 item at the cost of 1	7	6	6
2	Add	3 to resize (to 2 slots) 1 to add	7	6	3 9
3	Add	6 to resize (to 4 slots) 1 to add	7	6	3 9
4	Add	1 to add	7	6	15
5	Add	12 to resize (to 8 slots) 1 to add	7	6	3 9
6	Add	1 to add	7	6	15
7	Add	1 to add	7	6	21
8	Add	1 to add	7	6	27
9	Add	24 to resize (to 16 slots) and 1 to add	7	6	3 9
10	Add	1 to add	7	6	15
11	Add	1 to add	7	6	21
12	Add	1 to add	7	6	27
13	Add	1 to add	7	6	33
14	Add	1 to add	7	6	39
15	Add	1 to add	7	6	45
16	Add	1 to add	7	6	51
17	Add	48 to resize (to 32 slots) and 1 to add	7	6	3 9
18	Add	1 to add	7	6	15

a. Total cost? 1+3+1+6+1+12+1+1+1+1+24+1+1+1+1+1+1+1+1+48+1+1=110
b. Average actual cost: 110/23 = 4.8~
c. Amortized total cost: 7 * 18 =126
d. Average amortized cost: 126/18 = 7