

Recall that a comparison in any sort is any comparison of magnitude of any two entries in a list and which may or may not result in a swap of two values in a list.

8.3a In class, it was discussed how bubble sort requires approximately $n + 3d$ comparisons. Determine the unnecessary comparisons by considering the following sequence of sorting using bubble sort.

```
4 2 1 7 3 0 5 6
2 1 4 3 0 5 6 7
1 2 3 0 4 5 6 7
1 2 0 3 4 5 6 7
1 0 2 3 4 5 6 7
0 1 2 3 4 5 6 7
```

8.3b In class, it was discussed how bubble sort requires approximately $n + 1.5d$ comparisons if the order of sortings reverse direction.

```
4 2 1 7 3 0 5 6
2 1 4 3 0 5 6 7
0 2 1 4 3 5 6 7
0 1 2 3 4 5 6 7
0 1 2 3 4 5 6 7
```

8.3c Contrast your answer with the number of comparisons required by insertion sort:

```
4 2 1 7 3 0 5 6
2 4 1 7 3 0 5 6
1 2 4 7 3 0 5 6
1 2 4 7 3 0 5 6
1 2 3 4 7 0 5 6
0 1 2 3 4 7 5 6
0 1 2 3 4 5 7 6
0 1 2 3 4 5 6 7
```

8.3d What was Senator Obama's answer when asked

“What is the most efficient way to sort a million 32-bit integers?”

8.3e What would Prime Minister Harper's answer be to this same question?