

mshen4
CS230

Problem Set 6 Task 1

1. SELECTION SORT

| | | | | | | | | |
|-----|----|----|-----|-----|------|-----|------|------|
| 255 | 31 | 15 | 127 | 511 | 1023 | 63 | 7 | 2047 |
| 7 | 31 | 15 | 127 | 511 | 1023 | 63 | 255 | 2047 |
| 7 | 15 | 31 | 127 | 511 | 1023 | 63 | 255 | 2047 |
| 7 | 15 | 31 | 127 | 511 | 1023 | 63 | 255 | 2047 |
| 7 | 15 | 31 | 63 | 511 | 1023 | 127 | 255 | 2047 |
| 7 | 15 | 31 | 63 | 127 | 1023 | 511 | 255 | 2047 |
| 7 | 15 | 31 | 63 | 127 | 255 | 511 | 1023 | 2047 |
| 7 | 15 | 31 | 63 | 127 | 255 | 511 | 1023 | 2047 |
| 7 | 15 | 31 | 63 | 127 | 255 | 511 | 1023 | 2047 |

2. INSERTION SORT

| | | | | | | | | |
|-----|-----|-----|-----|-----|------|------|------|------|
| 255 | 31 | 15 | 127 | 511 | 1023 | 63 | 7 | 2047 |
| 31 | 255 | 15 | 127 | 511 | 1023 | 63 | 7 | 2047 |
| 31 | 15 | 255 | 127 | 511 | 1023 | 63 | 7 | 2047 |
| 15 | 31 | 255 | 127 | 511 | 1023 | 63 | 7 | 2047 |
| 15 | 31 | 127 | 255 | 511 | 1023 | 63 | 7 | 2047 |
| 15 | 31 | 127 | 255 | 511 | 63 | 1023 | 7 | 2047 |
| 15 | 31 | 127 | 255 | 63 | 511 | 1023 | 7 | 2047 |
| 15 | 31 | 127 | 63 | 255 | 511 | 1023 | 7 | 2047 |
| 15 | 31 | 63 | 127 | 255 | 511 | 1023 | 7 | 2047 |
| 15 | 31 | 63 | 127 | 255 | 511 | 7 | 1023 | 2047 |
| 15 | 31 | 63 | 127 | 255 | 7 | 511 | 1023 | 2047 |
| 15 | 31 | 63 | 127 | 7 | 255 | 511 | 1023 | 2047 |
| 15 | 31 | 63 | 7 | 127 | 255 | 511 | 1023 | 2047 |
| 15 | 31 | 7 | 63 | 127 | 255 | 511 | 1023 | 2047 |
| 15 | 7 | 31 | 63 | 127 | 255 | 511 | 1023 | 2047 |
| 7 | 15 | 31 | 63 | 127 | 255 | 511 | 1023 | 2047 |

3. QUICK SORT
underline: pivot
bold: final spot

| | | | | | | | | |
|------------|-----------|-----------|-----------|------------|------------|-------------|-------------|-------------|
| <u>255</u> | 31 | 15 | 127 | 511 | 1023 | 63 | 7 | 2047 |
| <u>63</u> | 31 | 15 | 127 | 7 | 255 | <u>1023</u> | 511 | 2047 |
| <u>7</u> | 31 | 15 | 63 | <u>127</u> | 255 | <u>511</u> | 1023 | <u>2047</u> |
| 7 | <u>31</u> | 15 | 63 | 127 | 255 | 511 | 1023 | 2047 |
| 7 | <u>15</u> | 31 | 63 | 127 | 255 | 511 | 1023 | 2047 |
| 7 | 15 | 31 | 63 | 127 | 255 | 511 | 1023 | 2047 |

4. MERGE SORT

| | | | | | | | | |
|-----|----|----|-----|-----|------|----|---|------|
| 255 | 31 | 15 | 127 | 511 | 1023 | 63 | 7 | 2047 |
|-----|----|----|-----|-----|------|----|---|------|

| | | | | | | | | |
|-----|----|----|-----|-----|------|----|---|------|
| 255 | 31 | 15 | 127 | 511 | 1023 | 63 | 7 | 2047 |
|-----|----|----|-----|-----|------|----|---|------|

| | | | | | | | | |
|-----|----|----|-----|-----|------|----|---|------|
| 255 | 31 | 15 | 127 | 511 | 1023 | 63 | 7 | 2047 |
|-----|----|----|-----|-----|------|----|---|------|

| | | | | | | | | |
|-----|----|----|-----|-----|------|----|---|------|
| 255 | 31 | 15 | 127 | 511 | 1023 | 63 | 7 | 2047 |
|-----|----|----|-----|-----|------|----|---|------|

| | | | | | | | | |
|-----|----|----|-----|-----|------|----|---|------|
| 255 | 31 | 15 | 127 | 511 | 1023 | 63 | 7 | 2047 |
|-----|----|----|-----|-----|------|----|---|------|

| | | | | | | | | |
|-----|----|----|-----|-----|------|----|---|------|
| 255 | 31 | 15 | 127 | 511 | 1023 | 63 | 7 | 2047 |
|-----|----|----|-----|-----|------|----|---|------|

| | | | | | | | | |
|----|-----|----|-----|-----|------|---|----|------|
| 31 | 255 | 15 | 127 | 511 | 1023 | 7 | 63 | 2047 |
|----|-----|----|-----|-----|------|---|----|------|

| | | | | | | | | |
|----|----|-----|-----|---|----|-----|------|------|
| 15 | 31 | 127 | 255 | 7 | 63 | 511 | 1023 | 2047 |
|----|----|-----|-----|---|----|-----|------|------|

| | | | | | | | | |
|---|----|----|----|-----|-----|-----|------|------|
| 7 | 15 | 31 | 63 | 127 | 255 | 511 | 1023 | 2047 |
|---|----|----|----|-----|-----|-----|------|------|

mshen4
CS230

Problem Set 6 Task 2

Q1: $O(n)$ because all the code in the method is $O(1)$ except for the while loop which is $O(n)$, so together, the entire method is just $O(n)$.

Q2: $O(1)$ because it is just a statement checking if count is zero.

Q3: $O(n)$ because the while loop is going to run n times (0 to $n-1$).

Q4: $O(1)$ because it is just checking if the CD titles are the same and !found is true.

Q5: $O(1)$ because it is just a reassignment of one of the collection's indices.

Q6: $O(1)$ because it is just incrementing int cd.

Q7: $O(1)$ because it is just returning a boolean.