```
"C:\Program Files\Java\jdk-10\bin\java.exe" "-javaagent:C:\Program Files\JetBrains\IntelliJ IDEA
Community Edition 2018.1.1\lib\idea_rt.jar=62042:C:\Program Files\JetBrains\IntelliJ IDEA Community
Edition 2018.1.1\bin" -Dfile.encoding=UTF-8 -classpath C:\Users\lkluc\OneDrive\Desktop\
Java_IntelliJprojects\assignment#6\out\production\assignment#6 com.jinglin.Main
10 numbers in almost sorted order
1 2 3 6 5 4 7 9 8 10
Bubble sort:
1 2 3 4 5 6 7 8 9 10
Quick sort:
1 2 3 4 5 6 7 8 9 10
Merge sort:
1 2 3 4 5 6 7 8 9 10
Bubble sort used the most comparison: 45
Quick sort is in the middle: 41
Merge sort used the least comparison: 9
Merge sort used the most interchange: 10
Bubble sort is in the middle: 4
Quick sort used the least interchange: 2

10 numbers in random order
9 8 6 4 3 2 1 7 10 5
Bubble sort:
1 2 3 4 5 6 7 8 9 10
Quick sort:
1 2 3 4 5 6 7 8 9 10
Merge sort:
1 2 3 4 5 6 7 8 9 10
Bubble sort used the most comparison: 45
Quick sort is in the middle: 24
Merge sort used the least comparison: 20
Bubble sort used the most interchange: 28
Merge sort is in the middle: 27
Quick sort used the least interchange: 8

10 numbers in reverse order
10 9 8 7 6 5 4 3 2 1
Bubble sort:
1 2 3 4 5 6 7 8 9 10
Quick sort:
1 2 3 4 5 6 7 8 9 10
Merge sort:
1 2 3 4 5 6 7 8 9 10
Quick sort used the most comparison: 49
Bubble sort is in the middle: 45
Merge sort used the least comparison: 19
Bubble sort used the most interchange: 45
Merge sort is in the middle: 34
Quick sort used the least interchange: 5

50 numbers in almost sorted order
2 1 4 3 5 6 7 13 9 10 11 12 8 14 15 16 17 18 19 20 22 21 23 24 33 26 27 28 29 30 31 32 25 34 35 36
37 38 39 50 41 42 43 44 45 46 47 48 49 40
Bubble sort:
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
37 38 39 40 41 42 43 44 45 46 47 48 49 50
Quick sort:
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
37 38 39 40 41 42 43 44 45 46 47 48 49 50
Merge sort:
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
37 38 39 40 41 42 43 44 45 46 47 48 49 50
Bubble sort used the most comparison: 1225
Quick sort is in the middle: 820
Merge sort used the least comparison: 96
```

```
Merge sort used the most interchange: 101
Bubble sort is in the middle: 46
Quick sort used the least interchange: 6


50 numbers in random order
52 93 27 23 21 60 31 81 56 90 69 62 49 69 25 65 56 90 35 96 66 32 72 26 40 51 96 46 57 52 64 41 15
53 50 56 15 96 94 23 66 61 96 46 89 4 81 71 73 52
Bubble sort:
4 15 15 21 23 23 25 26 27 31 32 35 40 41 46 46 49 50 51 52 52 52 53 56 56 56 57 60 61 62 64 65 66 66
 69 69 71 72 73 81 81 89 90 90 93 94 96 96 96 96
Quick sort:
4 15 15 21 23 23 25 26 27 31 32 35 40 41 46 46 49 50 51 52 52 52 53 56 56 56 57 60 61 62 64 65 66 66
 69 69 71 72 73 81 81 89 90 90 93 94 96 96 96 96
Merge sort:
4 15 15 21 23 23 25 26 27 31 32 35 40 41 46 46 49 50 51 52 52 52 53 56 56 56 57 60 61 62 64 65 66 66
 69 69 71 72 73 81 81 89 90 90 93 94 96 96 96 96
Bubble sort used the most comparison: 1225
Quick sort is in the middle: 226
Merge sort used the least comparison: 219
Bubble sort used the most interchange: 561
Merge sort is in the middle: 245
Quick sort used the least interchange: 81


50 numbers in reverse order
50 49 48 47 46 45 44 43 42 41 40 39 38 37 36 35 34 33 32 31 30 29 28 27 26 25 24 23 22 21 20 19 18
17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
Bubble sort:
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
37 38 39 40 41 42 43 44 45 46 47 48 49 50
Quick sort:
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
37 38 39 40 41 42 43 44 45 46 47 48 49 50
Merge sort:
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
37 38 39 40 41 42 43 44 45 46 47 48 49 50
Quick sort used the most comparison: 1249
Bubble sort is in the middle: 1225
Merge sort used the least comparison: 153
Bubble sort used the most interchange: 1225
Merge sort is in the middle: 286
Quick sort used the least interchange: 25


100 numbers in almost sorted order
1 2 3 4 5 6 7 8 9 17 11 12 13 14 15 16 10 18 19 20 21 22 23 24 29 26 27 28 25 30 31 32 33 34 35 36
37 38 39 41 40 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 74
70 71 72 73 69 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 97 91 92 93 94 95 96 90 98 99 100
Bubble sort:
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69
70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100
Quick sort:
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69
70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100
Merge sort:
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69
70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100
Bubble sort used the most comparison: 4950
Quick sort is in the middle: 3964
Merge sort used the least comparison: 92
Merge sort used the most interchange: 95
Bubble sort is in the middle: 43
Quick sort used the least interchange: 5
```

```
100 numbers in random order
63 60 16 51 82 67 27 92 79 41 36 14 10 48 72 26 99 71 55 8 17 65 25 87 8 15 36 31 44 15 56 30 59 26
63 88 55 79 27 6 94 2 5 87 70 55 5 89 66 74 36 65 50 80 57 53 11 94 17 33 28 70 87 86 44 84 68 11 98
 58 64 38 6 92 37 38 47 35 23 94 66 40 62 87 81 6 1 64 10 64 29 34 74 26 30 39 46 67 48 4
Bubble sort:
1 2 4 5 5 6 6 6 8 8 10 10 11 11 14 15 15 16 17 17 23 25 26 26 26 27 27 28 29 30 30 31 33 34 35 36 36
 36 37 38 38 39 40 41 44 44 46 47 48 48 50 51 53 55 55 55 56 57 58 59 60 62 63 63 64 64 64 65 65 66
66 67 67 68 70 70 71 72 74 74 79 79 80 81 82 84 86 87 87 87 87 88 89 92 92 94 94 94 98 99
Quick sort:
1 2 4 5 5 6 6 6 8 8 10 10 11 11 14 15 15 16 17 17 23 25 26 26 26 27 27 28 29 30 30 31 33 34 35 36 36
 36 37 38 38 39 40 41 44 44 46 47 48 48 50 51 53 55 55 55 56 57 58 59 60 62 63 63 64 64 64 65 65 66
66 67 67 68 70 70 71 72 74 74 79 79 80 81 82 84 86 87 87 87 87 88 89 92 92 94 94 94 98 99
Merge sort:
1 2 4 5 5 6 6 6 8 8 10 10 11 11 14 15 15 16 17 17 23 25 26 26 26 27 27 28 29 30 30 31 33 34 35 36 36
 36 37 38 38 39 40 41 44 44 46 47 48 48 50 51 53 55 55 55 56 57 58 59 60 62 63 63 64 64 64 65 65 66
66 67 67 68 70 70 71 72 74 74 79 79 80 81 82 84 86 87 87 87 87 88 89 92 92 94 94 94 98 99
Bubble sort used the most comparison: 4950
Quick sort is in the middle: 565
Merge sort used the least comparison: 523
Bubble sort used the most interchange: 2489
Merge sort is in the middle: 576
Quick sort used the least interchange: 207


100 numbers in reverse order
100 99 98 97 96 95 94 93 92 91 90 89 88 87 86 85 84 83 82 81 80 79 78 77 76 75 74 73 72 71 70 69 68
67 66 65 64 63 62 61 60 59 58 57 56 55 54 53 52 51 50 49 48 47 46 45 44 43 42 41 40 39 38 37 36 35
34 33 32 31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
Bubble sort:
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69
70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100
Quick sort:
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69
70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100
Merge sort:
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69
70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100
Quick sort used the most comparison: 4999
Bubble sort is in the middle: 4950
Merge sort used the least comparison: 356
Bubble sort used the most interchange: 4950
Merge sort is in the middle: 672
Quick sort used the least interchange: 50


Process finished with exit code 0
```