PA5 Part 1

Insertion Sort

Yellow hightlight = temp number

Red = Sorted

Random	
Iteration 0	[4, 7, 1, 2, 8, 3, 9]
Iteration 1	(7 < 4 ✘) - [4, 7, 1, 2, 8, 3, 9]
Iteration 2	(1<7✔) – (1<4✔) – [1, 4, 7, 2, 8, 3, 9]
Iteration 3	(2<7✔) – (2<4✔) – (1<2 ✘) – [1, 2, 4, 7, 8, 3, 9]
Iteration 4	(8<7 ✘) – [1, 2, 4, 7, 8, 3, 9]
Iteration 5	(3<8✔) – (3<7✔) – (3<4✔) – (3<2 ✘) – [1, 2, 3,4, 7, 8, 9]
Iteration 6	(9<8 ✘) – – [1, 2, 3, 4, 7, 8, 9]
Sorted	
Iteration 0	[1, 2, 3, 4, 7, 8, 9]
Iteration 1	(2<1 ✘) [1, 2, 3, 4, 7, 8, 9]
Iteration 2	(3<2 ✘) [1, 2, 3, 4, 7, 8, 9]
Iteration 3	(4<3 ✘) [1, 2, 3, 4, 7, 8, 9]
Iteration 4	(7<4 ✘) [1, 2, 3, 4, 7, 8, 9]
Iteration 5	(8<7 ✘) [1, 2, 3, 4, 7, 8, 9]
Iteration 6	(9<8 ✘) [1, 2, 3, 4, 7, 8, 9]
Reversed	
Iteration 0	[9, 8, 7, 4, 3, 2, 1]
Iteration 1	(8<9✔) [8, 9, 7, 4, 3, 2, 1]
Iteration 2	(7<9✔) - (7<8✔) – [7, 8, 9, 4, 3, 2, 1]
Iteration 3	(4<9✔) – (4<8✔) – (4<7✔) – [4, 7, 8, 9, 3, 2, 1]
Iteration 4	(3<9✔) – (3<8✔) – (3<7✔) – (3<4✔) – [3, 4, 7, 8, 9, 2, 1]
Iteration 5	(2<9✔) – (2<8✔) – (2<7✔) – (2<4✔) – (2<3✔) – [2, 3, 4, 7, 8, 9, 1]
Iteration 6	(1<9✔) – (1<8✔) – (1<7✔) – (1<4✔) – (1<3✔) – (1<2✔) [1, 2, 3, 4, 7, 8, 9]

Quicksort

Yellow highlight = Left pointer

Blue Highlight = right pointer

Green = pivot

Red = sorted

Random	
Start	[4, 7, 1, 2, 8, 3, 9]
First recursive call	[4, 7, 1, 2, 8, 3, 9] - [4, 7, 1, 2, 8, 3, 9] – (Swap) - [4, 3, 1, 2, 8, 7, 9] – (Move pivot) – [3, 1, 2, 4, 8, 7, 9]
Second Recursive call	[3, 1, 2, 4, 8, 7, 9] – [3, 1, 2] & [8, 7, 9] – [3, 1, 2.] & [8 ,7, 9] – (Move pivot) – [1, 2, 3] & [7, 8, 9] [1, 2, 3, 4, 7, 8, 9]
Third Recursive call	[1, 2, 3, 4, 7, 8, 9] – [1, 2] & [7] & [9] – [1, 2] & [7] & [9] [1, 2, 3, 4, 7, 8, 9]
Fourth Recursive call	[1, 2, 3, 4, 7, 8, 9] – [2] – [2] [1, 2, 3, 4, 7, 8, 9]
Sorted	
Start	[1, 2, 3, 4, 7, 8, 9]
First Recursive call	[1, 2, 3, 4, 7, 8, 9] – [1, 2, 3, 4, 7, 8, 9] [1, 2, 3, 4, 7, 8, 9]
Second Recursive call	[1, 2, 3, 4, 7, 8, 9] - [2, 3, 4, 7, 8, 9] [1, 2, 3, 4, 7, 8, 9]
Third Recursive call	[1, 2, 3, 4, 7, 8, 9] – [3, 4, 7, 8, 9] [1, 2, 3, 4, 7, 8, 9]
Fourth Recursive call	[1, 2, 3, 4, 7, 8, 9] – [4, 7, 8, 9] [1, 2, 3, 4, 7, 8, 9]
Fifth recursive call	[1, 2, 3, 4, 7, 8, 9] – [7, 8, 9] [1, 2, 3, 4, 7, 8, 9]
Sixth recursive call	[1, 2, 3, 4, 7, 8, 9.] – [8, 9] [1, 2, 3, 4, 7, 8, 9]
Seventh Recursive call	[1, 2, 3, 4, 7, 8, 9] – [9] [1, 2, 3, 4, 7, 8, 9]
Reversed	
Start	[9, 8, 7, 4, 3, 2, 1]
First Recursive Call	[9, 8, 7, 4, 3, 2, 1] – [9, 8, 7, 4, 3, 2, 1.] [8, 7, 4, 3, 2, 1, 9]
Second Recursive Call	[8, 7, 4, 3, 2, 1, 9] – [8, 7, 4, 3, 2, 1.] [7, 4, 3, 2, 1, 8, 9]

Third Recursive call	[7, 4, 3, 2, 1, 8, 9] – [7, 4, 3, 2, 1.] [4, 3, 2, 1, 7, 8, 9]
Fourth Recursive Call	[4, 3, 2, 1, 7, 8, 9] – [4, 3, 2, 1.] [3, 2, 1, 4, 7, 8, 9]
Fifth Recursive call	[3, 2, 1, 4, 7, 8, 9] – [3, 2, 1.] [2, 1, 3, 4, 7, 8, 9]
Sixth Recursive call	[2, 1, 3, 4, 7, 8, 9] – [2, 1.] [1, 2, 3, 4, 7, 8, 9]
Seventh Recursive call	[1, 2, 3, 4, 7, 8, 9] – [1] [1, 2, 3, 4, 7, 8, 9]

Cocktail Sort

Random	
Start	[4, 7, 1, 2, 8, 3, 9]
First Iteration	[4, 1, 2, 7, 3, 8, 9] – 3 swaps
Second Iteration	[1, 4, 2, 3, 7, 8, 9] – 2 swaps
Third Iteration	[1, 2, 3, 4, 7, 8, 9] – 2 swaps
Forth Iteration	[1, 2, 3, 4, 7, 8, 9] – No swaps so end
Sorted	
Start	[1, 2, 3, 4, 7, 8, 9]
First Iteration	[1, 2, 3, 4, 7, 8, 9] – No swaps so end
Reversed	
Start	[9, 8, 7, 4, 3, 2, 1]
First iteration	[8, 7, 4, 3, 2, 1, 9] – 6 Swaps
Second Iteration	[1, 8, 7, 4, 3, 2, 9] – 5 Swaps
Third Iteration	[1, 7, 4, 3, 2, 8, 9] – 4 Swaps
Fourth Iteration	[1, 2, 7, 4, 3, 8, 9] – 3 Swaps
Fifth Iteration	[1, 2, 4, 3, 7, 8, 9] – 2 Swaps
Sixth Iteration	[1, 2, 3, 4, 7, 8, 9] – 1 Swap
Seventh Iteration	[1, 2, 3, 4, 7, 8, 9] – No swaps so end