Stephen Sallas
03/16/2021
COMP-3270

HW3

1.	A = [6,8,6,10,12,9,15,13,14,19,18,17,16]

2.	a.	A = [10, 3, 9, 4, 8, 5, 7, 6], p = 1, r = 8, k =2

		A = [3, 4, 5, 6, 9, 8, 7, 10], p = 1, r = 8, k = 2

		A = [3, 4, 5, 6, 8, 9, 7, 10], p = 1, r = 8, k = 2

		A = [3, 4, 5, 6, 8, 9, 7, 10]

	b.	1.	The first base occurs when the starting and ending indexes are equal.

			Executed steps: step 1 (passes).

			T(first base case) = 7

		2.	The second base case occurs when kth smallest number is equal to the pivotDistance, so then the number at the pivot index is returned, A[q].

			Executed steps: step 1 (fails), step 2, step 3, step 4 (passes), step 5.

			T(second base case) = 20n + 17

		3.	Excecuted steps: step 1 (fails), step 2, step 3, step 4 (fails), step 6 , step 7 (executed if step 6 passes), step 8 (executed if step 6 fails).

			Worst case: $T(n) = (T(n-1) (20n + 16 + T(n-1))) + 7$

			Best case (one element): $T(n) = 7$

			Best case (sorted array): $T(n) = 20n + 7$

3.   A = [19, 6, 10, 7, 16, 17, 13, 14, 12, 9]

C =

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
0	0	0	0	0	0	1	1	0	1	1	0	1	1	1	0	1	1	0	1

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0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
0	0	0	0	0	0	1	2	2	3	4	4	5	6	7	7	8	9	9	10

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0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
0	0	0	0	0	0	0	1	2	2	3	4	4	5	6	7	7	8	9	9

B = [6, 7, 9, 10, 12, 13, 14, 16, 17, 19]

4.   1.   [3210, 4321, 2345, 4567, 5678]

        2.   [3210, 4321, 2345, 4567, 5678]

        3.   [3210, 4321, 2345, 4567, 5678]

        4.   [2345, 3210, 4321, 4567, 5678]

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5.   If length(A)=15
        Bucket0: 0..1/15
        Bucket1: 1/15..2/15
        Bucket2: 2/15..3/15
        Bucket3: 3/15..4/15
        Bucket4: 4/15..5/15
        Bucket5: 5/15..6/15
        Bucket6: 6/15..7/15
        Bucket7: 7/15..8/15
        Bucket8: 8/15..9/15
        Bucket9: 9/15..10/15
        Bucket10: 10/15..11/15
        Bucket11: 11/15..12/15
        Bucket12: 12/15..13/15
        Bucket13: 13/15..14/15
        Bucket14: 14/15..15/15

        If length(A)=n
        Bucket0: 0..1/n
        Bucket1: 1..2/n
        Bucket(n-2): n-2/n..n-1/n
        Bucket(n-1):n-1/n..n/n

6.   a.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
0	1	14	3	3	3	1	1	8	3	3	3	3	1	14	18	16	19	20	1

   b.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
-3	1	14	3	3	3	1	1	8	3	3	3	3	1	14	1	16	16	16	16

   c.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
3	1	-20	3	3	3	1	1	8	3	3	3	3	3	14	3	16	16	16	16

   d.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	1	14	3	3	3	1	1	8	3	3	3	3	1	14	1	1	1	1	1

7.