Project 1: Bit Rotation

1 PROBLEM

Given an array of size k, we want to rotate the elements within the array by some integer amount d to the left or right.

2 APPROACH

The pseudo code for the algorithm is as followed:

1. Divide the array into 2 parts: L and R, where the size of the L is d and the size of R is $k - d$.
2. If the size of L is smaller than the size of R, subdivide R into R_1 and R_2, where the size of R_2 is equal to that of L. Swap L with R_2. The resulting array is R_2R_1L. L is already at the final position in this case. Repeat step 1 with input parameters: array R_2R_1 and same value of d as before.
3. Else if the size of L is bigger than the size of R, subdivide L into L_1 and L_2, where the size of L_1 is equal to that of R. Swap R with L_1. The resulting array is RL_2L_1. R is already at the final position in this case. Repeat step 1 with input parameters: array L_2L_1 and d equal to $d - len(R)$.

Consider for example an array of size k = 8 and d = 3. Using the pseudo code above, the array rotation follows the following steps.

Step 1:	a	b	c	d	e	f	g	h
	f	g	h	d	e	a	b	c
Step 2:	f	g	h	d	e	a	b	c
	d	e	h	f	g	a	b	c
Step 3:	d	e	h	f	g	a	b	c
	d	e	g	f	h	a	b	c
Step 5:	d	e	g	f	h	a	b	c
	d	e	f	g	h	a	b	c

Running time: $O(k)$

Auxiliary memory: $O(1)$