5. Problem 5

$Array$: $[1, 12, 8, 7, -2, -3, 6]$

$n = 7, Median\ index = \frac{n}{2} = \left\lceil \frac{7}{2} \right\rceil = 4 \rightarrow k = 4$

1. $Pivot = 1, L = \{-2, -3\}, E = \{1\}, G = \{12, 8, 7, 6\}.$

   Check: $k \leq |L|? \rightarrow k = 4 \nleq |L| = 2 \rightarrow Not\ found \dots continue$

   Check: $|L| < k \leq |L| + |E|? \rightarrow 2 < 4 \nleq 2 + 1 \rightarrow Not\ found \dots continue$

   Check: $k > |L| + |E|? \rightarrow 4 > 2 + 1 \rightarrow Complete\ with\ the\ G - array$

2. $k' = k - |L| - |E| = 4 - 2 - 1 = 1$

   $Pivot = 12, L = \{8, 7, 6\}, E = \{12\}, G = \{\}$

   Check: $k \leq |L|? \rightarrow k = 1 \leq |L| = 3 \rightarrow Completewith\ the\ L - array$

   Check: $|L| < k \leq |L| + |E|? \rightarrow 3 \nless 1 \leq 3 + 1 \rightarrow Not\ found \dots continue$

3. $k = 1$

   $Pivot = 8, L = \{7, 6\}, E = \{8\}, G = \{\}$

   Check: $k \leq |L|? \rightarrow k = 1 \leq |L| = 2 \rightarrow Completewith\ the\ L - array$

   Check: $|L| < k \leq |L| + |E|? \rightarrow 2 \nless 1 \leq 2 + 1 \rightarrow Not\ found \dots continue$

4. $k = 1$

   $Pivot = 7, L = \{6\}, E = \{7\}, G = \{\}$

   Check: $k \leq |L|? \rightarrow k = 1 \leq |L| = 1 \rightarrow Completewith\ the\ L - array$

   Check: $|L| < k \leq |L| + |E|? \rightarrow 1 \nless 1 \leq 1 + 1 \rightarrow Not\ found \dots continue$

5. $k = 1$

   $Pivot = 6, L = \{\}, E = \{6\}, G = \{\}$

   Check: $k \leq |L|? \rightarrow k = 1 \nleq |L| = 0 \rightarrow Not\ found \dots continue$

   Check: $|L| < k \leq |L| + |E|? \rightarrow 0 < 1 \leq 0 + 1 \rightarrow Found!$

   $\therefore Required\ element\ is\ E = \{6\}$