CSE 332: Data Structures and Parallelism

Section 6: ForkJoin Practice

0. `lessThan7`

`public static int` **`lessThan7`**`(int[] arr)`
Returns the number of elements in `arr` that are less than 7.
For example, if `arr` is `[21, 7, 6, 8, 17, 1]`, then `lessThan7(arr) == 2`.

Your code must have $\mathcal{O}(n)$ work, $\mathcal{O}(\lg n)$ span, where n is the length of `arr`.

1. `parity`

`public static boolean` **`parity`**`(int[] arr)`
Returns `true` if there are an even number of even numbers and `false` otherwise.
For example if `arr` is `[1, 7, 4, 3, 6]`, then `parity(arr) == true`. But, if `arr` is `[6, 5, 4, 3, 2, 1]`, `parity(arr) == false`.

Your code must have $\mathcal{O}(n)$ work, $\mathcal{O}(\lg n)$ span, where n is the length of `arr`.

2. `countStrs`

`public static int` **`countStrs`**`(String str, String[] arr)`
Returns the number of elements in `arr` that equal `str`.
For example, if `arr` is `["h", "ee", "llll", "llll", "oo", "llll"]`, then `countStrs("llll", arr) == 3` and `countStrs("h", arr) == 1`.

Your code must have $\mathcal{O}(n)$ work, $\mathcal{O}(\lg n)$ span, where n is the length of `arr`.

3. `secondSmallest`

`public static int` **`secondSmallest`**`(int[] arr)`
Returns the second smallest unique element of `arr`. Assume `arr` contains at least two unique elements.
For example if `arr` is `[1, 7, 4, 3, 6]`, then `secondSmallest(arr) == 3`. But, if `arr` is `[6, 1, 4, 3, 5, 2, 1]`, `secondSmallest(arr) == 2`.

Your code must have $\mathcal{O}(n)$ work, $\mathcal{O}(\lg n)$ span, where n is the length of `arr`.

4. `powmod`

`public static void` **`powmod`**`(int[] arr, int p, int m)`
Replaces every element of `arr` with `arr[i]`$^{\texttt{p}}$ mod `m`.
For example if `arr` is `[1, 7, 4, 3, 6]`, then `powmod(arr, 2, 5)` would result in arr $=$ `[1, 4, 1, 4, 1]`.

Your code must have $\mathcal{O}(n)$ work, $\mathcal{O}(\lg n)$ span, where n is the length of `arr`.