3b.

the work for longest-run is

$O(n)$ Since it has to traverse the array

and keep a running count.

Since it is entirely sequential the span is

$O(n)$

3d. for longest_run_recursive :

work is ~~$\theta(\log n)$~~ $O(n)$

since you have to divide the list into $\log n$ parts,

you use the recurrence relation $W(n) = 2W(\frac{n}{2}) + O(1)$

since merge is constant.

span is $O(\log^2 n)$, since you set

$S(n) = S(\frac{n}{2}) + \log n$

3e by parallelizing the algorithm, the work and span remain

the same.

work : $O(n)$

span : $O(\log n)$