



$$\Delta < k+p$$

We can grow  $Q_i^T$  on the left if we need to by  $\Delta < (k+p)$ .

Just use Arrays, copyOf + arrayCopy  
Similarly, we can stop early by shrinking  $Q$  on the left (and be done),  
As soon as we read  $r$  rows, we need to make sure that there's another  $(k+p)$  available. If there isn't then we grow  $Q$  by  $\Delta$  (remainder) and proceed with  $Q$ -blocking.