Question 2 (10 points) Broadcast Algorithms

In class, we studied an algorithm algorithm for Atomic Broadcast in a system with reliable asynchronous messaging and no process failures. When the process’s application layer invokes $ABcast(m)$, the message $m$ is sent to the sequencer. The sequencer then sends the message to all processes (with a sequence number). Processes deliver messages in order of sequence number.

Consider this same Atomic Broadcast algorithm in a system model where channels are reliable, asynchronous, and FIFO. Further, assume there are no process failures, and that a sequencer has been chosen a priori. For each of the following, answer YES or NO and give a justification.

1. Does this Atomic Broadcast algorithm implement FIFO Reliable Broadcast?
2. Does this Atomic Broadcast algorithm implement Causal Reliable Broadcast?

Question 3 (10 points) Recall in quorum-based replication, $K$ is the total number of replicas for a data object, $R$ is the size of the read quorum, and $W$ is the size of the write quorum. To maintain replica consistency, we require that $R + W > K$ and $W + W > K$.

1. Amazon Dynamo uses $K = 3$. Why might a system administrator select a larger value of $K$? What benefit would using a larger value of $K$ provide?
2. Why would a system administrator select $W > R$. What type of system would benefit from this configuration?