Answer

- (c) This refinement mapping maps any behavior σ of this bounded buffer algorithm to the behavior containing only stuttering steps that leave ch equal to the empty sequence.
- (d) From the initial state, suppose the producer increments p. At that point, the consumer can execute its **while** loop—implying by (ii) that, under the refinement mapping, the sending of a message has already occurred. It is impossible to define such a refinement mapping that satisfies (i), since the producer has not yet chosen which message to put in the buffer.
- (e) Hint: Did you realize that part (d) is true only under the assumption that the set Msg of messages contains at least two different elements? Find a refinement mapping under which the sender always sends the same message. Use TLC to check your refinement mapping.