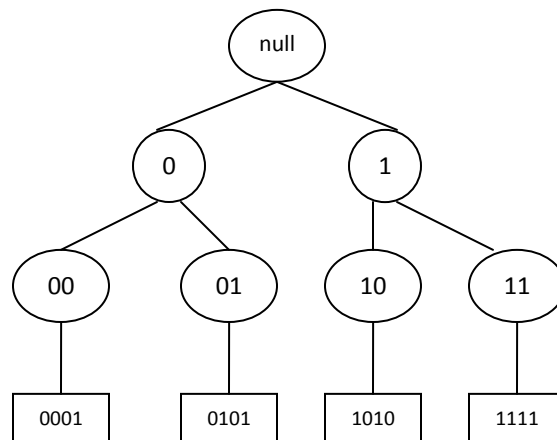


## Chapter 7 solutions

1. See Schwartz, M. (1988) *Telecommunication Networks Protocols Modeling, and Analysis*, Reading, MA: Addison-Wesley, pp. 424–433.
2. See Schwartz, M. (1988) *Telecommunication Networks Protocols Modeling, and Analysis*, Reading, MA: Addison-Wesley, pp. 424–433.
3. Each collision increases  $c$  by 0.5. With four collisions, we have  $Q+2$ . Idle slots decrease  $Q$  by 0.5. Therefore we have  $(Q+2) - 1.0$ . Therefore, the next frame has size  $Q+1$ .
4. Given  $c_0=4, c_1=2, c_k=4$ . (a)  $c_1+2c_k = 2 + (2 \times 4)$ , (b)  $2.39 \times 4$ , (c)  $c_1+2.39 \times 4$ , (d)  $(\log(4/8))/\log(1-1/8)$
5. Using Matlab, and iteration, the number of tags is 8.
6. The number of tags is 8.
7. The resulting tree to distinguish tag 1111, 01010, 1010, and 0001 is,



8. At the start of a  $R_{\text{frame}}$ , the reader will first detect the bitstring from tag-A in slot-1. Subsequently, tag-A is muted. Slot-2, however, will be idle. As a result, the reader sends a NACK to all tags; i.e., tag-D. This causes tag-D to reduce its transmission slot by one – i.e., 3. In Slot-3, the reader encounters another idle slot, which causes it to send another NACK. Similarly, tag-D reduces its transmission slot by one. As a result, tag-D will transmit in slot-2 in future  $R_{\text{frame}}$ .

9. Nine tags will respond.