National University of Singapore
School of Computing

CS2105 **Tutorial 7** Question paper

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1. **[KR, Chapter 6, R2]** If all the links in the Internet were to provide reliable delivery service, would the TCP reliable delivery service be redundant? Why or why not?

   It will be redundant because packets will not be corrupted or lost.

2. **[KR, Chapter 6, P5/P6]** Consider a 4-bit generator G with value **1001**, what is the CRC checksum R if data D has the following value?

   a) **11000111010**

   b) **01101010101**

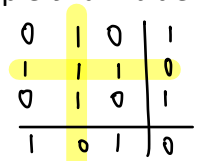
   c) **11111010101**

   d) **10001100001**

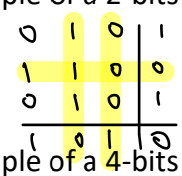
3. Consider the following two-dimensional parity matrix.

0	1	0	1
1	0	1	0
0	1	0	1
1	0	1	0

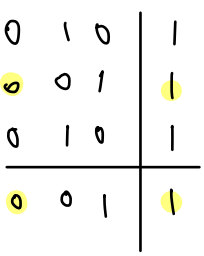
   a) Give an example of a 1-bit error that can be detected and corrected.



   b) Give an example of a 2-bits error that can be detected but cannot be corrected.



   c) Give an example of a 4-bits error that cannot be detected.



not good for internet ⇒ burst of data.

4. There are many nodes in a shared medium network and most nodes are likely to transmit frequently. Which of the following multiple access protocol(s) is (are) suitable? (1) TDMA; (2) CSMA; (3) Token passing.

Network is not used freq., sporadic burst of data ⇒ hard to use allocate fair resource.

✓ - less wasted slots.

X - ~~channel is always sensed~~ busy. Collision freq. ⇒ absent of acks. ⇒ inefficient.

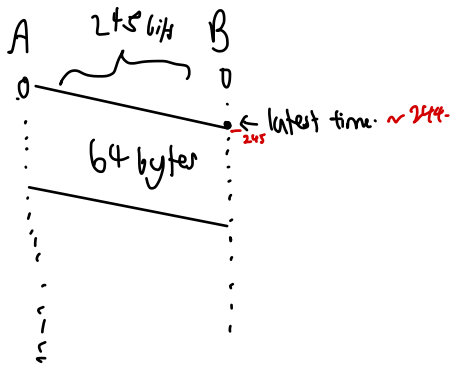
✓ - Works. ⇔ similar to TDMA. (circular)

5. Nodes A and B are accessing a shared medium using CSMA/CD, with propagation delay of 245 bit times between them (i.e., propagation delay equals to the amount of time to transmit 245 bits). Minimum frame size is 64 bytes. Suppose node A begins transmitting a frame at $t = 0$ bit time. Before A finishes, node B begins transmitting a frame. Assume no other nodes are active.

   Write down your answers to the following 2 questions in the unit of **bit time**.

   a) When is the latest time, by which B can begin its transmission? ~~245 bits~~ 244 bit time.

   b) Suppose B begin its transmission at the time computed in a), can A detects that B has transmitted before it finishes transmission? Yes. Since A minimum frame size is more than 245 bits.



B start at $t_B = 244$.

Signal arrive at A at $t = 244 + 245 = 489$ bt.

A's transmission time is $64 \times 8 = 512$ bt.

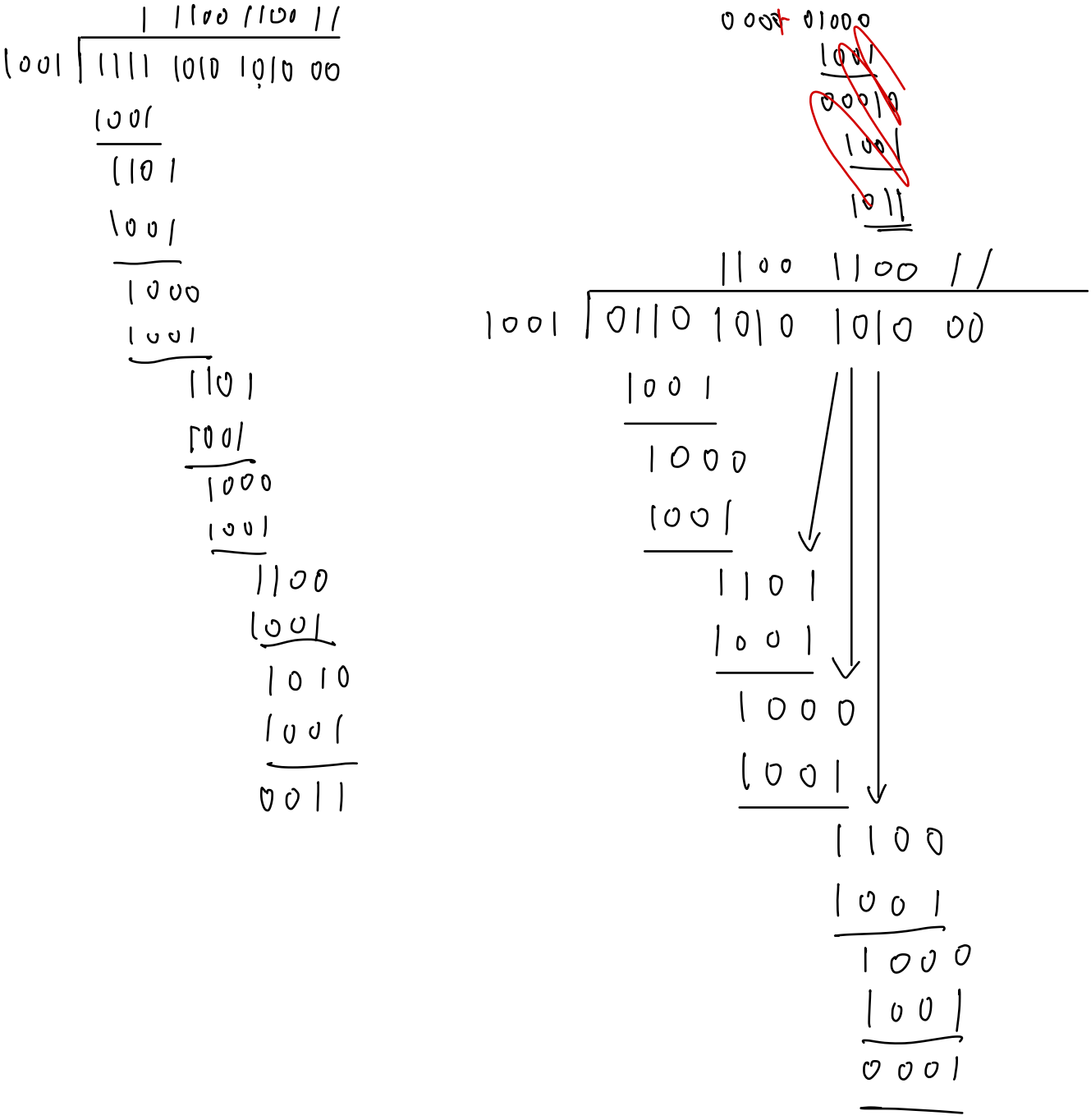
∴ Can.

a) **11000111010** ~~1001~~ 110

b) **01101010101** ~~0000~~ 011

c) **11111010101** 011 ✓

d) **10001100001** ~~1001~~ 110.



$$
\begin{array}{r}
1001\ 1111\ 0 \\
\hline
1001\ \overline{)\ 1000\ 1100\ 0000\ 00}
\end{array}
$$

$$
\begin{array}{r}
1001 \\
\hline
1110 \\
1001 \\
\hline
1110 \\
1001 \\
\hline
1110 \\
1001 \\
\hline
1111 \\
1001 \\
\hline
1100 \\
1001 \\
\hline
1010 \\
1001 \\
\hline
1100 \\
1001 \\
\hline
0101
\end{array}
$$