Final Exam – Detection of Errors in Digital Systems

1. In the development of the information age, Claude Shannon introduced the concept of _____ to information which is equivalent to a shortage of information content in a message, thus introducing errors to the message.
    a. redundancy
    b. enthalpy
    c. entropy
    d. compression

2. _____ is not an error detection technique.
    a. Parity check
    b. Cyclic redundancy check
    c. ACK / NAK
    d. Checksum

3. Compute the checksum for the following data block (using the running XOR method):
AE 6F 5A 80 7F 5B 55 4C.
    a. 7A
    b. AE
    c. 52
    d. 26

4. Compared with a checksum and a CRC, a parity check is the fastest, easiest form of error detection, but is the least reliable.
    a. True
    b. False

5. Of the following _____ is the most robust error detection technique.
    a. checksum
    b. CRC
    c. parity check
    d. ACK / NAK

6. Anomalies such as _____ can be detected in a data transfer by using a checksum.
    a. data transposed from big endian to little endian
    b. single and multiple bit errors
    c. data bytes out of order in the message
    d. all of the above

7. The heart of the CRC algorithm is the _____.
    a. generator polynomial
    b. microprocessor
    c. hash function
    d. message digest

8. A parity bit is computed by performing a logical _____ on a set of bits.
    a. XOR
    b. AND
    c. OR
    d. NAND

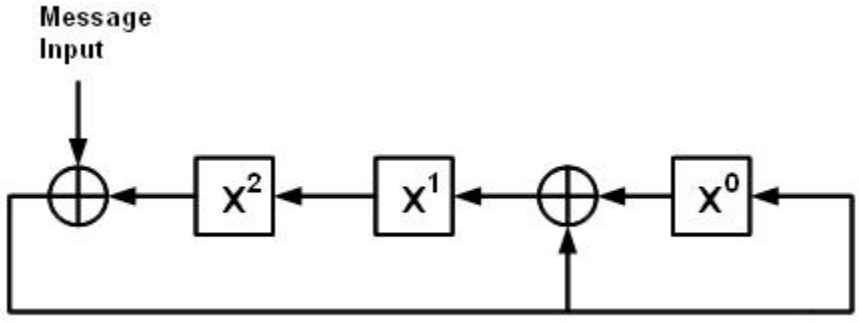
9. The use of a CRC in a data transfer can detect anomalies such as _____.
    a. data transposed from big endian to little endian
    b. single and multiple bit errors
    c. data bytes out of order in the message
    d. all of the above

10. In order to maintain even parity on the following set of bits: 0 1 0 1 1 0, the parity bit would be set to _____.
    a. 1
    b. 0

11. Error detection techniques are used to _____.
    a. reliably recover data stored in a memory device
    b. ensure the reliable delivery of data over a communications channel
    c. add overhead
    d. both A & B

12. The automatic repeat request (ARQ) is a technique used for error correction in which _____.
    a. any errors that are detected on the receiving end are corrected without retransmission
    b. an error correction code (ECC) is used to correct any errors that are received
    c. no extra data is transmitted, only the message
    d. the receiving end will check a block of data using an error detection code and when an error is detected the receiving end will request for the data to be resent

13. _____is the generator polynomial for the following CRC circuit:



    a. $G = x^3 + x^2 + 1$
    b. $G = x^8 + x^3 + x + 1$

c. $G = x^3 + x + 1$
d. $G = x^2 + x + 1$

14. Using the CRC circuit shown above, with an initial value of [0 0 0] and a message of [1 0 1 0], the final CRC value will be _____.
    a. 1 0 1
    b. 0 1 1
    c. 1 1 1
    d. 1 0 0

15. A cryptographic hash function has all of the following properties except _____.
    a. it is extremely difficult to modify a message without changing the hash
    b. the hash function computes a variable-length hash value
    c. it is extremely difficult to generate a message with a given hash
    d. it is extremely difficult to find two different messages with the same hash