COSC244 Tutorial
From Lecture 10 & 11

1. What is meant by a layered protocol? Why are protocols layered? Use an example to explain the three components of a layered protocol: service, interface, and protocol.

2. Match the functions in the table with the OSI layer that performs them.
   Hint for the OSI model: *All People Seem To Need Data Processing*.

OSI Layer	Function
Physical	synchronisation
Data link	contention
Network	data compression
Transport	definition of a signal's electrical characteristics
Session	electronic mail
Presentation	encryption/decryption
Application	error detection
	establishing and releasing a connection
	file transfers
	format conversion
	routing
	token passing

3. Which of the OSI model layers deal primarily with network operations (i.e. operations that are particular to the transmission of data) ?

4. Distinguish between a LAN and a WAN. Why do we have both LANs and WANs ?

5. Suppose a bi-directional token ring network connects eight devices numbered 1 through 8 in a clockwise order. What device failures would prevent device 1 from sending messages to device 4?

6. Discuss the advantages and disadvantages of the three topologies: star, ring, and bus. For some real-time applications, which topology is the most suitable one?

7. What is the difference between contention and collision?

8. What is a contention protocol?

9. Describe the Aloha protocol, listing its advantages and disadvantages.

10. Distinguish between slotted and pure Aloha.

11. What is the difference between 0-persistent CSMA and non-persistent CSMA?

12. Why does collision detection improve the performance of CSMA?

13. What is the binary exponential backoff technique?

14. Ethernet uses the CSMA/CD protocol. Assume an Ethernet uses the coaxial cable with a rate of 10 Mbps, its longest distance is 5 km, and a signal propagates along the cable at a rate of 200 m/μsec. Calculate the minimum frame size required.

15. Comment on the following statement:

    With 1-persistent CSMA, a waiting station always transmits when the medium is clear. Why not change the protocol so that when the medium is clear the station waits the amount of time it would take for another station's transmission to reach it? If it is still clear, then transmit. This should decrease the chances of the two waiting stations colliding.