1. Raise two main advantages of packet switching, compared to message switching

1) Possibility to breaking long messages into multiple packet
2) Packets can be delivered and reassembled at destination

2. Given a 20-bit frame and bit-error-rate *p* in communication. What is the probability that the frame has no error? What is the probability of 1-bit errors?

$P_0 = \binom{0}{20} p^0 (1-p)^{20}$ it's for probability when fram has no error

$P_0 = \binom{1}{20} p^1 (1-p)^{19}$ it's for probability when fram has 1-bit error

3. Give two features that the data link layer and transport layer have in common, and further give two features in which they differ.

Common features:

1) Can provide flow control
2) can support multiplexing
3) provide recovery from transmission error

Differ things:

1) Data link layer transport frames, where transport layer cannot
2) Data link layer may concerned with medium acces control when transport layer doesn not

4. Which OSI layer is responsible for (a) determining the best path to route packets; (b) providing end-to-end reliable communications; (c) providing node-to-node reliable communications?

a) Network layer
b) Transport layer
c) Data link layer

5. How does the network layer in a connection-oriented packet-switching network differ from the network layer in a connectionless packet-switching network?

Network layer offer either connection-oriented and connectionless services for delivering packets across the network. For example connection-oriented like TCP and connectionless like UDP differ that TCP need three handshake steps to start transfer SDU. When UDP can immediately transfer SDU, does not connection setup.