The following questions are short answer and should not require more than one or two sentences. Please submit your answers via a typed hard copy one week from today.

1. What is a MAC address and how does it help in the process of routing data?
   * The Media Access Control address is a unique identifier attached to an individual network interface. This is used to ensure that the data that is being send has an address for the machine that sent the transmission and the one that is going to receive this transmission. With MAC addresses, each node in a network knows who a transmission was meant for.
2. Why do we need an IP address when we have a MAC address?
   * IP addresses are distributed in large sections to various organizations and companies instead of being determined by hardware. IP address are more hierarchical and easier to store data than physical addresses(MAC) are.
3. Describe encapsulation and its importance in structuring data intended to be communicated to another device.
   * Encapsulation is when the data package containing the header and the data from upper layer becomes the data that is repackaged at the next lower level with lower layer’s header. The header is used at the receiving side to extract the data from the encapsulated data packet. Each layer is needed from the one above it, this keeps integrity of data when a data transmission is performed.
4. Briefly describe the differences between TCP and UDP.
   * TCP is a connection-oriented protocol. It takes care of errors on the transmission. The connection can recover from errors and re transmit data. Guarantees message delivery.
   * UDP is a connectionless protocol. It does not correct or recover from errors. The receiving connection is responsible to detect and recover from errors. UDP is faster than TCP
5. If we didn’t have the Transport layer, what would we lose?
   * Stablishing long running connection and ensuring data integrity through error checking and data verification. Nodes in a network can direct traffic towards many different receiving services. The receiving takes traffic that is all in at the same node and delivering to the proper receiving service.
6. Why are address classes inefficient when describing blocks of IP address and how is CIDR a better solution?
   * Address classes were the first attempt to splitting up IP addresses space. Address classes could not keep everything organized. Companies preferred to join class C networks and they were a lot of entries routed to the same place.
   * CIDR uses subnet masks to demarcate networks. Allows addresses to be defined by two individual IDs and allows networks to be different sizes. Combine the address space of two classes into one contiguous chunk when two classes are required.
7. Much like your telephone number, an IP address has a network prefix and a host number. Explain how this enables IP to be a stateless protocol and creates a hierarchical structure.
   * Servers do not retain session information about each communication partner. The IP address is assigned automatically each time a device is connected to a network. Hierarchical addressing breaks the address space up into ordered chunks. It can be quickly determined to which network an address belongs.