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Computer Networks
Homework #4

1.)

a. Datagram switching doesn't require a connection to another host; the sender can send packets without any confirmation from the other side.
   This makes sending messages very easy to set up, but it doesn't guarantee that the other host will receive anything. Datagram switching also is very difficult if someone is hard-coding the forwarding tables at each switch, especially if a network is large.

b. Virtual circuit switching requires that a sender and a receiver establish communications with one another prior to any exchange of data. This guarantees that both hosts know that there is a connection, and prevents packets from being sent to a host that isn't ready or able to receive information.
   Overhead for packets will be smaller in VC switching, as each packet will not need to know the address of the host on the other end.

c. Cell Switching is a very fast method, and involves sending packets of a single, fixed size. This makes it much easier to build hardware, as you will know exactly how big every packet will be.
   Some disadvantages could involve the fact that, because packets are so small, the ratio of the addressing information to data sent to the host is very large. In other words, you aren't sending a lot of information with each packet, yet each packet has a significant amount of information already used for addressing.

2.) Fixed length packets vs. Variable Length Packets:

a. Fixed length packets make it easier to implement the hardware linking one host to another, as the hardware can guarantee that every packet will be the same size. This makes things less complicated, and makes the infrastructure easier to design. A drawback to fixed length packets is that you may have wasted space in packets when you aren't sending as much data.
b. In variable length packets, you can adjust the packet size to fit your need for how much data you're sending. This makes unnecessarily large packets uncommon. A downside to variable length packets is the fact that the hardware needs to be more complex to compensate for the fact that the length of each packet is different.

3.) Switches/Bridges/Routers:

a. A switch is a device that has multiple computers connected to it, and it serves as a way to create larger networks from interconnected links.

A bridge simply connects two LANs. If a packet needs to go from one port to another, the bridge will send the packet through. The main difference between a switch and a bridge is the fact that a bridge can only connect two LANs, while a switch can connect many. Switches and bridges both operate with layer 2 packets; they do not utilize IP packets.

b. A router is different because it uses IP datagrams, rather than layer 2 packets like switches and bridges. Routers allow for heterogeneity, which means that because they allow for IP packet transfer, they can connect networks with different protocols (ATM can be connected to Ethernet through a router, for example).

4.) Four Characteristics of a Network Switch:

a. Switches connect more than two ports, unlike bridges.
b. They manage the flow of data by transmitting packets only to specified addresses.
c. Switches usually operate at the data link layer. Switches that operate on multiple layers in the OSI model are known as multilayer switches.
d. Switches perform packing switching in order to inspect data and get the information necessary to send it to the desired host

5.) I would use a network switch to involve virtual circuit switching. This would let users in my network transfer data to other users on the network without disturbing anyone else.