1. True or False. (10 points, 1 point each)

(a) [T  F] In the traditional per-router routing, the router’s forwarding table is used to determine the output link based on the destination address of an incoming packet.

(b) [T  F] In the traditional per-router routing, the destination address of an incoming packet must belong to only one IP address range in the forwarding table.

(c) [T  F] A router typically has multiple network interfaces and each interface is associated with one IP address.

(d) [T  F] The IP header in one IP datagram never changes in its way from the source host to the destination host.

(e) [T  F] All the devices (including hosts and routers) within the same subnet have the same subnet part of IP address. They can physically reach each other without intervening a router.

(f) [T  F] The organization that uses the IP address block 200.1.1.0/23 can assign the block of 200.1.1.0/24 to its sub-organization.

(g) [T  F] The organization that uses the IP address block 200.1.1.0/23 can assign the block of 200.1.2.0/24 to its sub-organization.

(h) [T  F] DHCP is an application which runs between a host and the DHCP server for the subnet where the host is. As a result, the host will not hear IP datagram which carries a DHCP message from the DHCP server to another hosts within the same subnet.

(i) [T  F] IP address is used to reach the host, so it is not allowed to use the same IP address for distinct hosts.

(j) [T  F] As long as one host has a valid IP address, it is reachable by another host which knows its IP address.

2. (5 points) DHCP is used to dynamically assign an IP address to the host who requests for a valid IP address in a subnet. In addition to IP address assigned to the host, what else information can be obtain using DHCP? (please list at least two).

3. (10 points) Consider the topology shown in Figure 1. Denote the three subnets with hosts (starting 1 clockwise at 12:00) as Networks A, B, and C. Denote the subnets without hosts as Networks D, E, and F.

(a) Assign network addresses to each of these six subnets, with the following constraints: All addresses must be allocated from 214.97.254.0/23; Subnet A should have enough addresses to support 250 interfaces; Subnet B should have enough addresses to support 120 interfaces; and Subnet C should have enough addresses to support 120 interfaces. Of course, subnets D, E and F should each be able to support two interfaces. For each subnet, the assignment should take the forma.b.c.d/x or a.b.c.d/x - e.f.g.h/y.

(b) Using your answer to part (a), provide the forwarding tables (using longest prefix matching) for each of the three routers.
Figure 1: Three routers connecting six subnet