P11. Consider a router that interconnects three subnets: Subnet 1, Subnet 2, and Subnet 3. Suppose all of the interfaces in each of these three subnets are required to have the prefix 223.1.17/24. Also suppose that Subnet 1 is required to support at least 60 interfaces, Subnet 2 is to support at least 90 interfaces, and Subnet 3 is to support at least 12 interfaces. Provide three network addresses (of the form a.b.c.d/x) that satisfy these constraints.

Because the subnet 1 is required to support 60 interfaces and 2^6 > 60, the prefix for subnet 1 is at most 32-6=26.

Because the subnet 2 is required to support 90 interfaces and 2^7 > 90, the prefix for subnet 2 is at most 32-7=25.

Because the subnet 1 is required to support 60 interfaces and 2^4 > 12, the prefix for subnet 3 is at most 32-4=28.

Assume the network address for subnet 2 is 223.1.17.128/25.

So assume the network address for subnet 1 is 223.1.17.0/26.

The network address for subnet 3 is 223.1.17.64/28.

So the answer is

subnet 1 223.1.17.0/26

subnet 2 223.1.17.128/25

subnet 3 223.1.17.64/28.

P20. In this problem, we’ll explore the impact of NATs on P2P applications. Suppose a peer with username Arnold discovers through querying that a peer with username Bernard has a file it wants to download. Also suppose that Bernard and Arnold are both behind a NAT. Try to devise a technique that will allow Arnold to establish a TCP connection with Bernard without application-specific NAT configuration. If you have difficulty devising such a technique, discuss why.

It is not possible to devise such a technique. To establish a direct TCP connection, either Arnold or Bernard must send a SYN segment to the other to initial a connection. But the NAT has no application-specific configuration, the NAT cannot figure out the destination address and thus drop the segment. So it is not possible to establish a TCP connection if both Bernard and Arnold are behind NATs.