HOMEWORK 9 (NETWORK LAYER)

CONCEPTS

- CIDR Addressing and Subnetting
- IP Fragmentation
- Link State Routing
- Distance Vector Routing

Q1

Consider a router that interconnects 3 subnets: subnet1, subnet2 and subnet3. Suppose all of the interfaces in each these three subnets are required to have the prefix 223.1.17/24. Write down the "network" address of each subnet (of the form a.b.c.d/x) so that: (1) subnet1 supports at least 60 hosts; (2) subnet2 supports at least 90 hosts; and (3) subnet3 supports at least 12 hosts.

Q2

Consider a subnet with prefix 128.119.40.128/26. Give an example of one IP address in dotted-quad-notation (xxx.xxx.xxx.xxx) that can be assigned to this network. If an ISP owns the block of addresses of the form 128.119.40.64/26, and it wants to create 4 subnets from this block, where each block having the same number of hosts. What are the prefixes (of the form a.b.c.d/x) for the 4 subnets?

Q3

Consider sending a 2400-byte datagram into a link that has an MTU of 700 bytes. Suppose the original datagram is stamped with an ID=422. How many fragments are generated? What are the values in each IP headers (i.e., ID, frag-flag, offset, and length)?

Q4:

Consider the following network. With the indicated link costs, use Dijkstra's shortest-path-algorithm to compute the shortest path from x to all network nodes. Show all your steps.
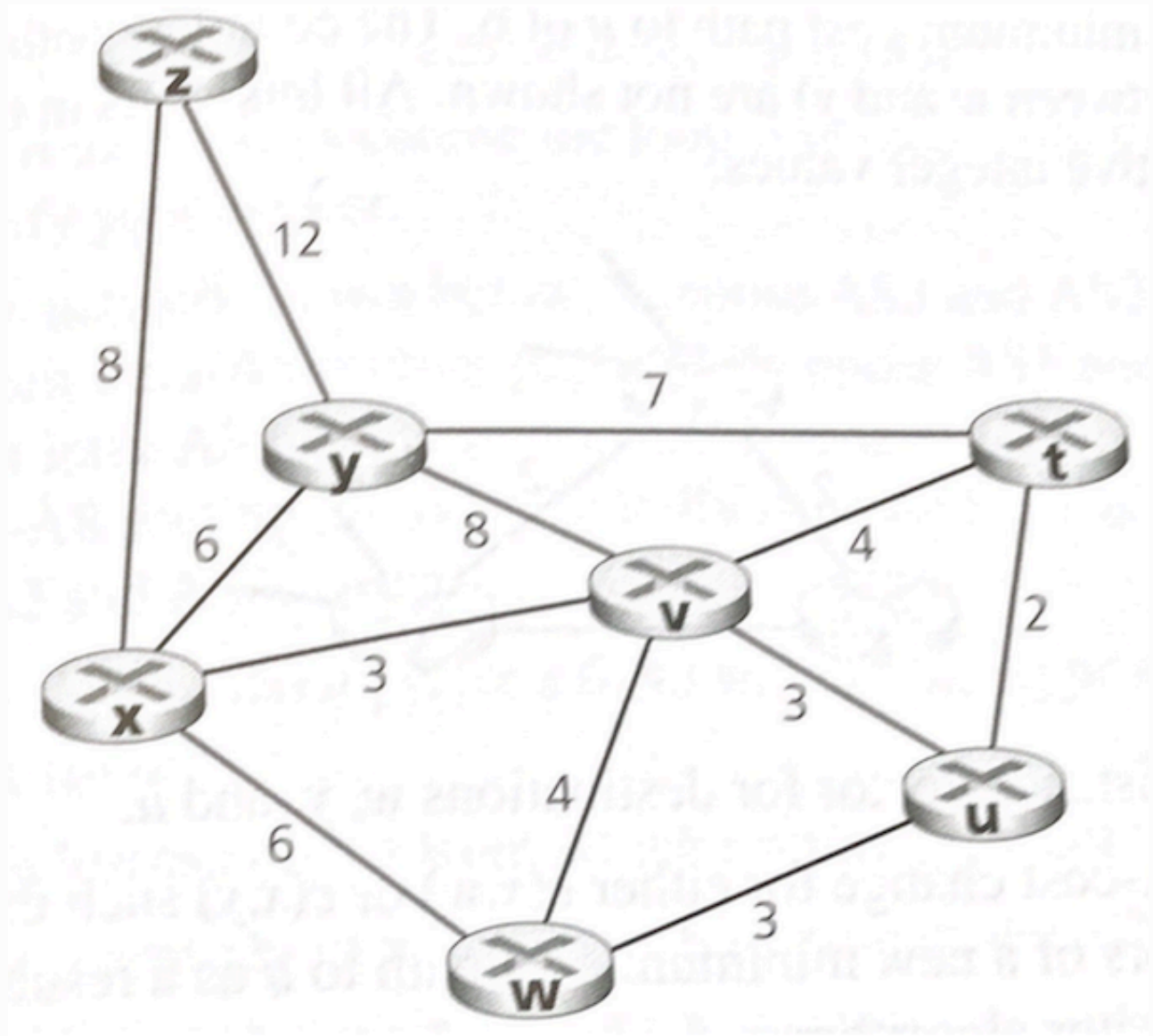
Q5:

Consider the network shown below, and assume that each node initially knows the costs to each of its neighbours. Consider the distance-vector algorithm and show the distance table entries at node z.

u

1

v

6

2

3

z

2

y

3

x