Homework 3

Question 1

A)

$link = 20Mbps, TCP\ segment\ size = 1000bytes, Propagation\ delay = 0.2s$

$$\frac{(\text{max window size} * segment\ size)}{Propagation\ delay} = \text{link capacity}$$

$$max\ window\ size = \frac{link\ capacity * popagation\ delay}{segment\ size} = \frac{20 * 10^6 * 0.2}{1000 * 8} = 500\ segments$$

B)

The window size is between $\frac{W}{2}$ and W. Therefore, the average window size is $\frac{3W}{4} = 3 * \frac{500}{4} = 375$ segments.

The average throughput is $375 * \frac{1000*8}{0.2} = 15000000 = 15 * 10^6$

C)

$$\frac{W}{2} * 0.2 = \frac{500}{2} * 0.2 = 50s$$

Question 2

A)

Question 3

A)

Prefix Match	Address range	Number of Addresses
10	10000000 − 10111111	64
01	01000000 − 01111111	64
11	11000000 − 11111111	64
Otherwise	00000000 − 00111111	64

B)

Prefix Match	Address range	Number of Addresses
101	10100000 − 10111111	32
111	11100000 − 11111111	32
01	01000000 − 01111111	64

Otherwise	00000000 − 00111111	128
	11000000 − 11011111	
	10000000 − 10011111	

Question 4

$diagram = 2400 byte, link\ MTU = 260 bytes, identification\ number = 21$

$$Fragments\ generated = \frac{Datagram\ size - IP\ header\ size}{MTU\ size - IP\ header\ size} = \frac{2400 - 20}{260 - 20} = 9.91667$$
$$\approx 10\ fragments$$

Fragment	Flag	Length	Identification	Offset
1	1	260	21	0
2	1	260	21	$(240/8) = 30$
3	1	260	21	60
4	1	260	21	90
5	1	260	21	120
6	1	260	21	150
7	1	260	21	180
8	1	260	21	210
9	1	260	21	240
10	0	240	21	270

Fragment 10: $2400 - 20 - (9 * 240) + 20 = 240$

Question 5

A)

$Subnet$: 192.168.56.64/26

$Example\ IP\ address\ =\ 192.168.56.65$

B)

Subnet nr.	Subnet Address
1	192.168.56.128/28
2	192.168.56.144/28
3	192.168.56.160/28
4	192.168.56.176/28

Question 6

Match	Action
Ingress port = 1	Forward(2)
IP Src = 10.3.0.*	
IP Dst = 10.1.0.*	

Ingresss port = 2 IP Src = 10.1.0.* IP Dst = 10.3.0.*	Forward(1)
Ingress port = 1 IP Dst = 10.2.0.3	Forward(3)
Ingress port = 2 IP Dst = 10.2.0.3	Forward(3)
Ingress port = 1 IP Dst = 10.2.0.4	Forward(4)
Ingress port = 2 IP Dst = 10.2.0.4	Forward(4)
Ingress port = 3 IP Src = 10.2.0.3 IP Dst = 10.2.0.4	Forward(4)
Ingress port = 4 IP Src = 10.2.0.4 IP Dst = 10.2.0.3	Forward(3)