Ankara University
Computer Engineering Department
COM3032
Final
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150 min.

You need to organize your exam answers as a single pdf document. You have to upload your pdf extension file to the system by naming it as StudentID.pdf.

ANKARA ÜNİVERSİTESİ
MÜHENDİSLİK FAKÜLTESİ

SINAVLAR VE ÖDEVLER İÇİN ŞEREF SÖZÜ

Bir Ankara Üniversitesi öğrencisi olarak;

- -Bu ödevde/sınavda yardım almadığımı ya da hiç kimseye yardım etmediğimi,
- -Başkasına ait olan bir çalışmayı kendi çalışmam olarak sunmadığımı,
- -Sınav/ödev sorularının çözümü için hiç kimseden (öğrenci, öğretim üyesi ya da arkadaş) yardım istemediğimi,
- -Problemin çözümünü bulmak için interneti ya da çevrimiçi ya da basılı herhangi bir belgeyi kullanmadığımı beyan ederim.

Yukarıdaki ifadelere uymadığımın tespit edilmesi durumunda sınavdan/ödevden sıfır alacağımı ve hakkımda **Ankara Üniversitesi Öğrenci Disiplin Yönetmeliği** çerçevesinde soruşturma açılacağını biliyorum.

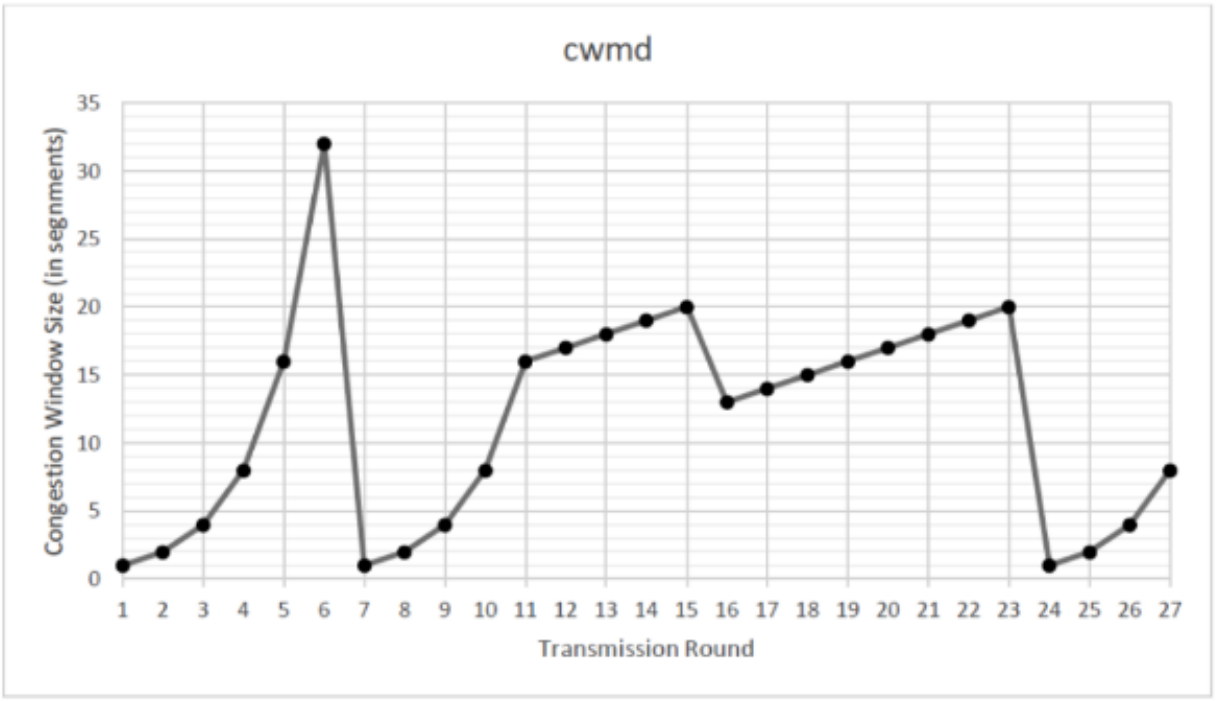
HONOR CODE FOR EXAMS and ASSIGMENTS

As an Ankara University student, I agree that;

- I have neither given nor received unauthorized assistance on this exam or assignment.
- I have not represented the work of another as my work.
- I have not asked someone else (student, teacher, and friends) to help with this assignment or exam questions.
- I have not used the internet or any online or printed document to find problem solutions

I understand that failure to comply with the statements above will result in receiving a zero from this exam/assignment and being reported for academic dishonesty by the **disciplinary policies of Ankara University**.

1. (15p)



Assuming TCP Reno is the protocol experiencing the behavior shown above, answer the following questions.

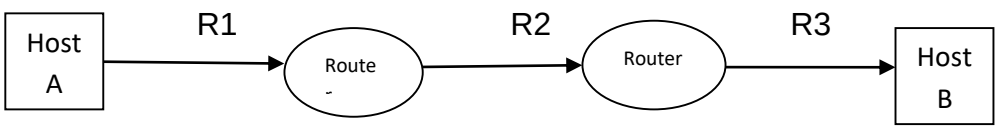
a. Identify the intervals of time when TCP slow start is operating.

b. Identify the intervals of time when TCP congestion avoidance is operating.

c. During what transmission round is the 120th segment sent? (Provide a short discussion justifying your answer.)

2. (15p) (Show each step in your solution.)

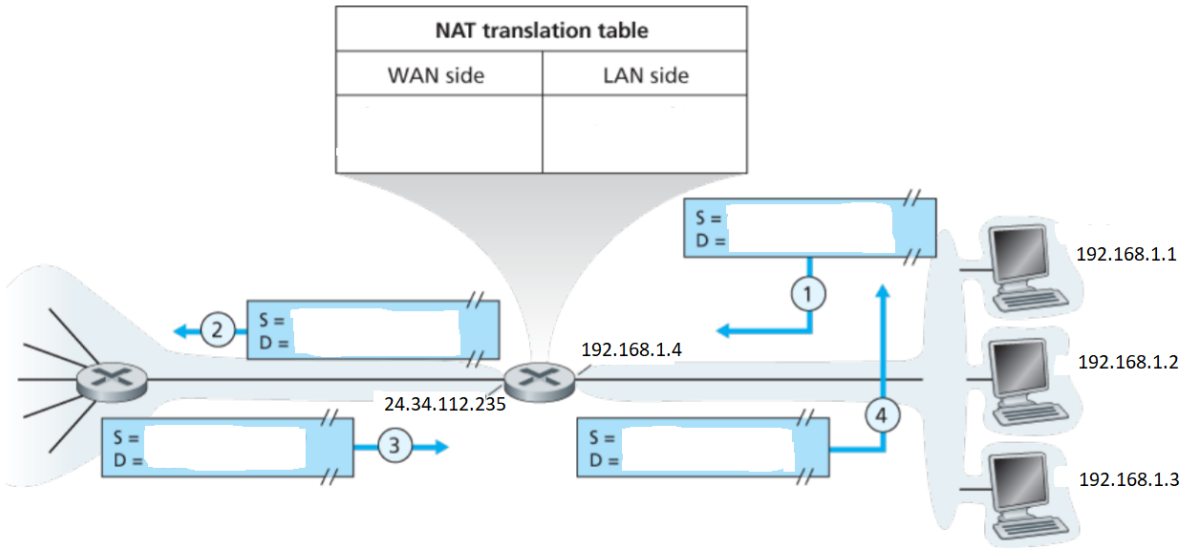
Suppose host A wants to send a large file (the file size is 8 million bytes) to host B. The path from host A to host B has three links, of rates R1=1600 kbps, R2=400 kbps, and R3=2 Mbps. Both routers use store-and-forward transmission. Assume no other traffic in the network. Ignore propagation delay. How long will it take transfer the file to host B?



3. (15p)

NAT Translation Table	
WAN Side	LAN Side
24.34.112.235, 4000	192.168.1.1, 3345
24.34.112.235, 4001	192.168.1.1, 3346
24.34.112.235, 4002	192.168.1.2, 3445
24.34.112.235, 4003	192.168.1.2, 3446
24.34.112.235, 4004	192.168.1.3, 3545
24.34.112.235, 4005	192.168.1.3, 3546

Consider the following network setup with NAT enabled router. Suppose each host has two ongoing TCP connections, all to port 80 at host 128.119.40.86. The six corresponding entries in the NAT translation table is provided.
Provide source (S) and destination (D) IP addresses and port numbers in the given 4 packets. (Consider only first host connection). Please be careful about the direction of the packets.



4. (15p)

Consider a datagram network using 8-bit host addresses. Suppose a router uses longest prefix matching and has the following forwarding table:

Prefix	Match Interface
10	0
010	1
0110	2
0111	3
11	4
00	5

For each of the six interfaces, give the associated range of destination host addresses and the number of addresses in the range.

5. (15p)

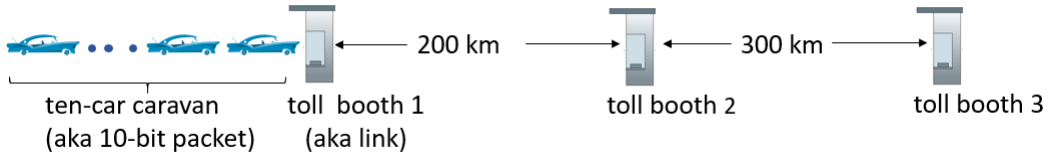
Given:

Host IP Address	192.168.78.211
Network Mask	255.255.0.0
Subnet Mask	255.255.224.0

Find:

Number of Subnet Bits	
Number of Subnets	
Number of Host Bits per Subnet	
Number of Usable Hosts per Subnet	
Subnet Address for this IP Address	
IP Address of First Host on this Subnet	
IP Address of Last Host on this Subnet	
Broadcast Address for this Subnet	

6. (15p) (Show each step in your solution.)



Car ~ bit; caravan ~ packet; toll service ~ link transmission
Toll booth-1 takes 120 sec to service car (bit transmission time)
Toll booth-2 takes 20 sec to service car (bit transmission time)
Cars “propagate” at 1000 km/hr.
Do not use store and forward. Cars may travel from booth1 to booth3 individually.

Write down where each of the cars in the caravan are after 16 minutes. Name your cars as Car1, Car2, …, Car10. Car1 is the first car that starts its travel.

7. (10p) List and explain packet scheduling policies in detail.