0907422 Computer Networks (Fall 2009)
Midterm Exam

الاسم: ..... رقم التسجيل: ..... رقم الشعبة: 1

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Instructions: Time **60** min. Closed books & notes. No calculators or mobile phones. **No questions are allowed**. Show your work clearly and limit your answer to the space provided.

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Q1. State one unique advantage for each of the following access networks. Don't use same advantage to multiple networks. (*5 points*)

Access Network	Advantage
Dial-up Modem	**Can use any telephone line**
Digital Subscriber Line (DSL)	**Uses the existing telephone infrastructure**
Cable modems	**Provides integrated services (data and TV)**
Fiber to home	**Provides high transfer rate**
Wireless	**Provides mobility of hosts**

Q2. Give one case when packet loss occurs. (*2 points*)

_____**When a packet reaches a full queue.** _____

Q3. Two hosts are connected via a router. The router has two links and each link is connected with one host. Each link is 125 meters long and has a transfer rate of 1 Gbps. If the router's queuing delay is 5 µs and the propagation speed is 250,000 km/s, what is the total transfer delay of a 1-KB packet from one host to the other? (Ignore processing delay). (*4 points*)

d_{proc} = 0
d_{queue} = 5 µs
d_{tarns} = 2 * (1 KB * 8 bits) / $1*10^9$ = 16 µs
d_{prop} = (125 + 125) / $250*10^6$ = 1 µs
d_{total} = 0 + 5 + 16 + 1 = 22 µs

Q4. What does each of the following abbreviations stands for? (*5 points*)

Abbreviation	Name
HTTP	**Hyper Text Transfer Protocol**
TCP	**Transmission Control Protocol**
UDP	**User Datagram Protocol**
SMTP	**Simple Mail Transfer Protocol**
DNS	**Domain Name System**

Q5. A system administrator installed a proxy server in her small company. Although the users reported shorter access times to web pages after this installation, the administrator noticed that the LAN utilization has increased. Explain this increase. (*2 points*)

___**Shorter access times allows the users to increase their browsing rate, thus resulting in higher**

___**Transfer rates** _____

Q6. The local DNS server gets an IP address by contacting a hierarchy of DNS servers. List the order in which these DNS servers are accessed. (*3 points*)

1) _____**Root** _____

2) _____**Top-level domain** _____

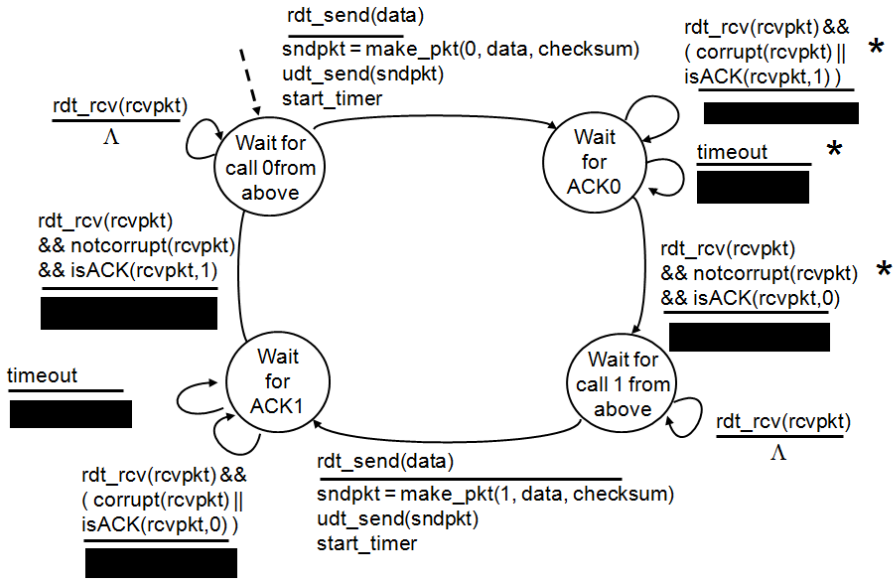
3) _____**Authoritative** _____

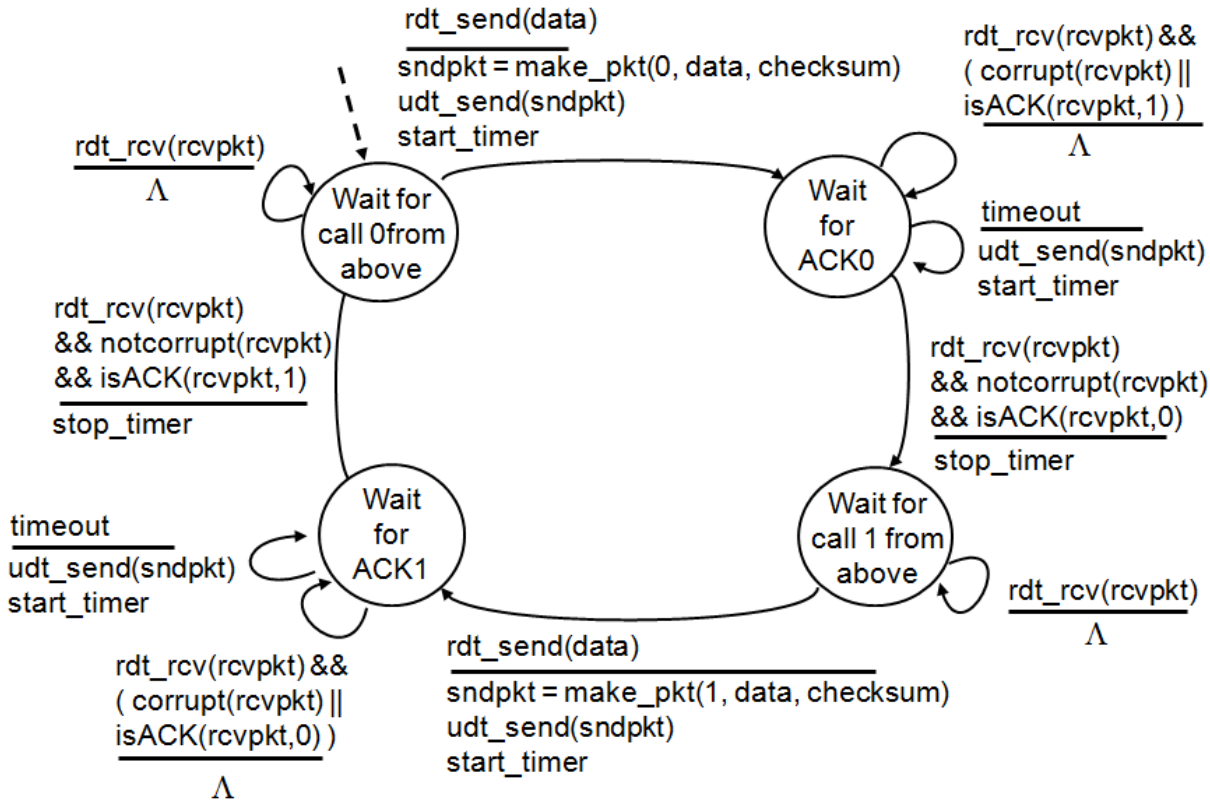
Q7. Find the UDP checksum of the following two binary numbers. (*2 points*)

```
  1000 0000 1111 0000
+ 1000 1111 0000 1000
----------------------
 10000 1111 1111 1000

  0000 1111 1111 1000          add the carry
+                   1
----------------------
  0000 1111 1111 1001
  1111 0000 0000 0110         complement
```

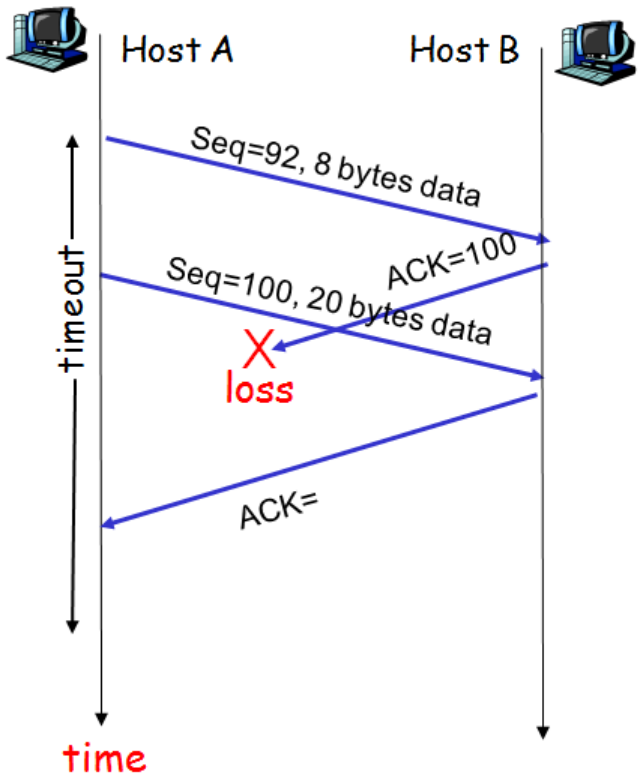
Q8. The following diagram is the state diagram of a sender that achieves reliable data transfer (rdt 3.0) over a channel that has bit errors and loss. Some of the sender's actions are omitted from this diagram. For the events marked with "*", specify the needed actions. You can use pseudo code or narrative descriptions. (*4 points*)





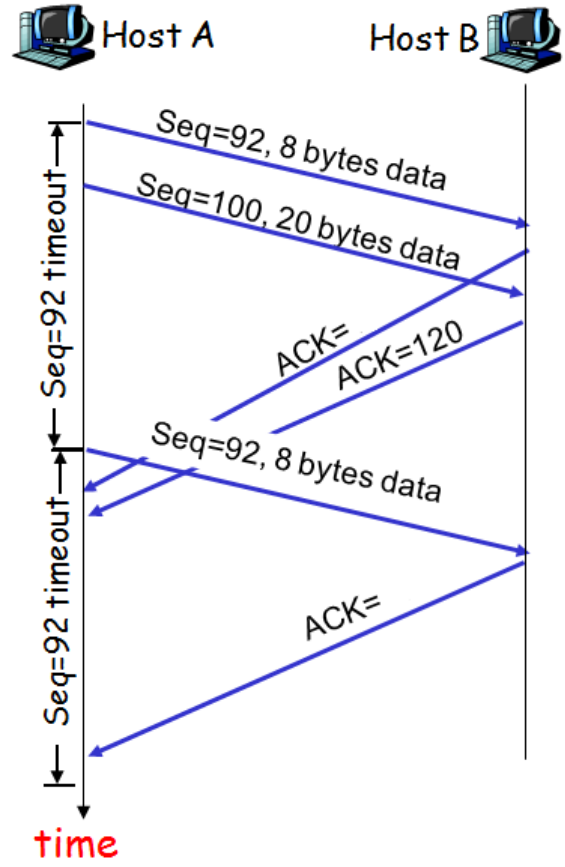
Q9. For the following two TCP transmission scenarios, there are three omitted acknowledgement numbers. Specify the value of three numbers on the two diagrams. (*3 points*)

Scenario 1



ACK = 120

Scenario 2



ACK = 100

ACK = 120

<Good Luck>