

בנק שאלות – בוחן בקורס "מבוא לתקשורת נתונים", סתיו תש"פ

קצת על הבוחן:

- משך הבוחן: שעה
- חומר עזר מותר: מחשבון וטושים צבעוניים בלבד
- הבוחן יכיל 7 שאלות מרובות ברירה המבוססות על בנק השאלות בשינויים מזעריים
- רק טופס התשובות ייבדק
- בהצלחה!

שאלות משיעורי הבית:

1. תרגיל בית 1, שאלה 1
2. תרגיל בית 1, שאלה 2
3. תרגיל בית 1, שאלה 3
4. תרגיל בית 2, שאלה 1
5. תרגיל בית 2, שאלה 3

שאלות מהספר:

6. פרק 1, שאלה R11:

Suppose there is exactly one packet switch between a sending host and a receiving host. The transmission rates between the sending host and the switch and between the switch and the receiving host are R_1 and R_2 , respectively. Assuming that the switch uses store-and-forward packet switching, what is the total end-to-end delay to send a packet of length L ? (Ignore queuing, propagation delay, and processing delay.)

7. פרק 1, שאלה P2:

Equation 1.1 gives a formula for the end-to-end delay of sending one packet of length L over N links of transmission rate R : $d_{end-to-end} = N * L / R$. Generalize this formula for sending P such packets back-to-back over the N links.

8. פרק 1, שאלה P12:

A packet switch receives a packet and determines the outbound link to which the packet should be forwarded. When the packet arrives, one other packet is halfway done being transmitted on this outbound link and four other packets are waiting to be transmitted. Packets are transmitted in order of arrival. Suppose all packets are 1,500 bytes and the link rate is 2 Mbps. What is the queuing delay for the packet? More generally, what is the queuing delay when all packets have length L , the transmission rate is R , x bits of the currently-being-transmitted packet have been transmitted, and n packets are already in the queue?

9. פרק 2, שאלה R19:

In Section 2.7, the UDP server described needed only one socket, whereas the TCP server needed two sockets. Why? If the TCP server were to support n simultaneous connections, each from a different client host, how many sockets would the TCP server need?

10. פרק 2, שאלה P7:

Suppose within your Web browser you click on a link to obtain a Web page. The IP address for the associated URL is not cached in your local host, so a DNS lookup is necessary to obtain the IP address. Suppose that n DNS servers are visited before your host receives the IP address from DNS; the successive visits incur an RTT of RTT_1, \dots, RTT_n . Further suppose that the Web page associated with the link contains exactly one object, consisting of a small amount of HTML text. Let RTT_0 denote the RTT between the local host and the server containing the object. Assuming zero transmission time of the object, how much time elapses from when the client clicks on the link until the client receives the object ?

11. פרק 2, שאלה P21:

Suppose that your department has a local DNS server for all computers in the department. You are an ordinary user (i.e., not a network/system administrator). Can you determine if an external Web site was likely accessed from a computer in your department a couple of seconds ago? Explain.

12. פרק 3, שאלה R6:

Is it possible for an application to enjoy reliable data transfer even when the application runs over UDP? If so, how?

13. פרק 3, שאלה R7:

Suppose a process in Host C has a UDP socket with port number 6789. Suppose both Host A and Host B each send a UDP segment to Host C with destination port number 6789. Will both of these segments be directed to the same socket at Host C? If so, how will the process at Host C know that these two segments originated from two different hosts?

14. פרק 3, שאלה P27:

Host A and B are communicating over a TCP connection, and Host B has already received from A all bytes up through byte 126. Suppose Host A then sends two segments to Host B back-to-back. The first and second segments contain 80 and 40 bytes of data, respectively. In the first segment, the sequence number is 127, the source port number is 302, and the destination port number is 80. Host B sends an acknowledgment whenever it receives a segment from Host A.

- a. In the second segment sent from Host A to B, what are the sequence number, source port number, and destination port number?
- b. If the first segment arrives **before** the second segment, in the acknowledgment of the first arriving segment, what is the acknowledgment number, the source port number, and the destination port number?
- c. If the second segment arrives before the first segment, in the acknowledgment of the first arriving segment, what is the acknowledgment number?
- d. Suppose the two segments sent by A arrive in order at B. The first acknowledgment is lost and the second acknowledgment arrives after the first timeout interval. Draw a timing diagram, showing these segments and all other segments and acknowledgments sent. (Assume there is no additional packet loss.) For each segment in your figure, provide the sequence number and the number of bytes of data; for each acknowledgment that you add, provide the acknowledgment number.