

NAME _____

计算机网络与通信
Sample exam

DIRECTIONS:

1. This is a closed book exam. You cannot refer to books, notes or notebooks, but you can bring 4 page cheat sheet (handwriting only)
2. You have 75 minutes to complete the exam. Read through the entire exam before beginning, in order to budget your time accordingly.
3. You are required to answer all 6 questions. Read the questions carefully. Do not assume the questions are the same as the homework assignment, projects, or quizzes. Do not forget to answer all questions.
4. State the assumptions you make clearly.
5. **Show all of your work if you wish to receive partial credit.**

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[A]. (10 points) For each of the following questions, circle only **ONE** choice that best answers the question or completes the sentence.

- 1) Consider two stations A and B connected using a single link with a one-way channel bandwidth of B bits/second. Let L be the size of a message in bits, and P be the propagation delay on the link, the total time taken by a message to reach from A to B (with the time measured from when A begins to transmit the first bit and when B receives the last bit) is
 - a) $P + (L * B)$
 - b) $(1/B) + P * L$
 - c) $P + (1 / (L*B))$
 - d) $P + (L / B)$
- 2) According to the OSI model, properties such as sending frames between adjacent nodes is covered by the
 - a) Physical layer
 - b) Data link layer
 - c) Transmission layer
 - d) Network layer
- 3) When a peer Alice uses BitTorrent to download files,
 - a) She only fulfills requests from those neighbors that are currently supplying her data at the highest rate
 - b) She can eventually finish downloading the complete files even if she does not fulfill any request from others
 - c) She will randomly choose a chunk that Alice does not have yet to download
 - d) None of the above
- 4) The following applications use client-server architecture only
 - a) Online banking
 - b) Instance messages
 - c) Skype
 - d) All of the above

[B]. True or false.

- 1) Host A is sending Host B a large file over a TCP connection. Assume Host B has no data to send Host A. Host B will not send acknowledgements to Host A, because Host B cannot piggyback the acknowledgements on data.
- 2) Suppose Host A is sending a large file to Host B over a TCP connection. If the sequence number for a segment of this connection is m , then the sequence number for the subsequent segment will necessarily be $m + 1$.
- 3) The difference between a worm and a virus is that a worm can infect a computer without user interaction while a virus requires some form of user interaction to enter a computer.
- 4) Suppose 100 users share a communication link, and each user transmits 20% of the time. The probability that exact 20 users transmit at the same time is $\binom{100}{20} (0.8)^{20} (0.2)^{80}$.

[C] (8 points) Let RTT be the round trip delay between the client and the server. Suppose the HTML file references 30 very small objects on the same server. Neglect transmission times or TCP slow start and assume that the **IP address of the server is cached** at the client, how much time elapses with

a. Non-persistent HTTP with no parallel TCP connections?

b. Non-persistent HTTP with up to 15 parallel connections?

c. Persistent HTTP?