CS 447-003 Networks and Data Communications
Spring 2024
Quiz #5 on February 8, 2023 (SOLUTIONS)

Your Last Three Digits: _____
(please do NOT write all of your student ID or your name)

Grade: _____

****

(1) HTTP is a stateless application-layer protocol. What does "stateless" mean?

State-less protocols are the network protocols where a server (in either a client-server or in a peer-to-peer network application) does not keep (remember) anything the server received before*[1] (in any of its previous network transmissions).

OR

State-less protocols are the network protocols where each transmission is independent (no semantical linkage with any other transmissions) at a server*[1].

Note 1: the underlined concepts are the essential (required) concept.

Note 2: It is **the server** who does not remember anything (this should be explained).

(2) Explain why multiple threads are needed at a proxy for handling HTTP network traffic?

Since a proxy needs to handle network traffics in two directions (physically) at the same time (one for from a browser to a web server and another for from a web server to a web browser), which can not be performed at the same time using only one thread since "*recv*" is a blocking function (if a thread tries to handle S→C traffic, it blocks on the *recv* for S→C, making it impossible for the proxy to handle C→S traffic (since doing it requires own "*recv*") and vice versa.

Note: the underlined concept is needed for decent (or full) credit.

(3) What are "parity bits"? How do parity bits detect transmission errors (explain)?

What: Parity bids are the extra bits ("extra" to payload bits, attached after the payload bits)) for detecting bit errors at the receiver side.

How: The parity bit(s) count(s) the number of '1s' in the given payload bits and the parity bit(s) make(s) sure that the number of '1's" in the payload bits and the parity bit(s) to be either an odd number ("odd parity") or an even number ("even parity"). The parity bit(s) let(s) a receiver detect some bit errors (those that are changed during their transmissions), **if the number or '1's'** is an odd number while the even parity is agreed between a sender and a receiver (or vice versa for the odd parity).

Note 1: the underlined concepts are needed for full credit.

Note 2: What the parity-bit error detection counts needs to be precisely (and accurately) described – it is **"the number of '1's' in the transmitted bits** (except for the start and the stop bits).

(4) Explain how "undetectable errors" are possible using a parity bit.

Under the parity-bit error detection, a receiver will not detect bit errors (undetectable), if an even number of bits are modified (cause errors) during their transmissions, since any even number of bit errors will let the number of them remains the same "even number" for the even parity (or "odd number for the odd parity).

Note: the underlined concepts are needed for full credit.

(5) Explain how "framing errors" are possible using parity bits?

Framing errors under the asynchronous transmission using a parity bit happens when a receiver fails to (correctly) detect the start bit of a new frame, which can happen in the following ways:

(a) A receiver misrecognizes the last payload bit in a current frame as the stop bit (= 0) while the parity happens to be '1' (the receiver misrecognizes the parity bit as the start bit for the next frame).

OR

(b) A receiver misrecognizes the first payload bits in the next frame) as the stop bit (= 0) while its second payload bit happens to be '1' (the receiver misrecognizes the parity bit as the start bit).

Note 1: the underlined concepts are needed for full credit.

Note 2: either (a) or (b) should be mentioned for full credit.