(1) What are “ports” used by socket connections? Why does socket use “ports”?

- “ports” are logical connecting points (note: ports are NOT “connections”) in the transport layer.
- without ports, there will be only one active network process at a network host computer at a time (it is because, IP addresses are identifier of host computers)

(2) Show the structure of the server-side socket process (what APIs are used in what order in a server process) – for a server that establishes socket connections, receives a payload message from clients, and sends a response to each client.
(3) Which socket APIs are blocking APIs (mention all the blocking socket APIs to be used in Project #1 in this course)?

**Server-side:** `accept()` and `recv()` (or `read()`)

**Client-side:** `connect()` and `recv()` (or `read()`)

(4) On success, what information does the *sockaddr_in* structure specified as the second parameter in `accept` API hold?

The *sockaddr_in* structure specified as the second parameter in `accept` API holds the remote client’s IP address and the remote client’s port number.

(5) What is “link utilization”? How is “link utilization” calculated for stop-and-wait ow control (show the formula)?

Link utilization is the ratio of “the time a sender uses to transmit its data ("packets" for packet-switching networks)” to “the total time needed for a sender uses to transmit its data.

OR

Link utilization is the ratio of “the network transmission bandwidth used for transmitting data ("packets" for packet-switching networks)” to “the total available network transmission bandwidth”.

\[ U = \frac{T}{T + 2 \times G}, \]

where:

\[ T = \text{a packet transmission delay} \]

\[ G = \text{signal propagation delay} \]