Computer Networks II

Course 18/19 :: Test 1 (extra)

Escuela Superior de Informática

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This exam has 11 questions with a value of 20 points. Three wrong answers substract a point. Only an answer is correct if otherwise not stated. The use of calculator and smartphone is forbidden and must remain off and stored during the test. The maximum duration of this test is 40 minutes.

Regarding the ANSWER SHEET:

- *Fill in your personal data in the form above.*
- *Enter* Computer Networks II *in the field EVALUATION.*
- *Indicate your ID in the side box (also marking the corresponding cells).*
- *Check the box «**1**» in the TYPE OF EXAMINATION box.*

Check your answers only when you are completely sure. The scanner does not support corrections or deletions of any kind. It will automatically cancel them. You must only deliver the answer sheet.

Surname: _____ Firstname: _____ Group: _____

1 [1p] Mark the correct statement regarding the flow control mechanism:

- ☐ **a**) Prevent network saturation.
- ☐ **b**) Prevents routers' output queues from filling up.
- ☐ **c**) Identify which is the output interface in the *cut-through* switches.
- ☐ **d**) Avoid saturation of a slow receiver.

2 [1p] In a point-to-point link, what is the physical broadcast address use?

- ☐ **a**) Query for the destination logical address.
- ☐ **b**) Send a message to all routers in the network.
- ☐ **c**) Implement a neighbor discovery protocol.
- ☐ **d**) Applicable link protocols have not (or don't use) broadcast address.

3 [1p] Which of the following is a cause of the network performance drop during an episode of congestion?

- ☐ **a**) TCP sending buffer discards data from the application.
- ☐ **b**) TCP receiving buffer discards packets from the network.
- ☐ **c**) The input queue on routers discard packets from the network.
- ☐ **d**) The output queue on the router is empty before delivery.

4 [1p] Which of the following statements about the client-server model are right? (check two).

- ☐ **a**) The client process is the one that initiates the communication.
- ☐ **b**) The client process is the one that sends data.
- ☐ **c**) The server process is the one that receives data.
- ☐ **d**) The server process waits to be contacted by the client.

5 [1p] An application sends 1 message of 50 bytes every 10 seconds. The transmission time of each message is 1 ms. What are the descriptors of this traffic:

- ☐ **a**) Avg. data rate: 50 bps; Peak data rate: 300 bps; Maximum burst size: 10 s.
- ☐ **b**) Avg. data rate: 40 bps; Peak data rate: 40 bps; Maximum burst size: 1ms.
- ☐ **c**) Avg. data rate: 50 bytes; Peak data rate: 300 bytes; Maximum burst size: 6 ms.
- ☐ **d**) The descriptors of this traffic cannot be calculated.

E. [1p] Consider the following scenario that represents the sending and receiving buffers during the start of the connection between a client and a TCP server.

```
sender sending buffer:      |X|X|X|-|-|-|-|-|
receiveer receiving buffer: |-|-|-|-|-|-|-|-|
                             1 2 3 4 5 6 7 8
```

Mind the following considerations:

- Each buffer position represents 100 bytes.
- A hyphen (-) represents free space for 100 bytes in the buffer.
- An X represents 100 occupied data bytes in the buffer.
- The sender is using Slow Start.
- The segment size is MSS=100 bytes.

> **6** (0.25 points) What is the maximum value that the receiver can announce in the Window field of its first TCP segment?

☐ **a**) 200 bytes ☐ **b**) 500 bytes ☐ **c**) 600 bytes ☐ **d**) 800 bytes

> **7** (0.25 points) What is the value of the congestion window (cwnd)?

☐ **a**) 100 bytes ☐ **b**) 200 bytes ☐ **c**) 500 bytes ☐ **d**) 600 bytes

> **8** (0.25 points) What is the value of the receiving window (rwnd)?

☐ **a**) 200 bytes ☐ **b**) 500 bytes ☐ **c**) 600 bytes ☐ **d**) 800 bytes

> **9** (0.25 points) What is the value of the sending window (swnd)?

☐ **a**) 100 bytes ☐ **b**) 200 bytes ☐ **c**) 500 bytes ☐ **d**) 600 bytes

E. [2p] After establishing a TCP connection, the sender invokes `send(data)`, where the size of `data` is 300 bytes. After the execution of this operation, the buffers of the transmitter/receiver remain defined as follows:

```
sender sending buffer:     |X|X|X|-|-|-|-|-|
receiver receiving buffer: |-|-|-|-|-|-|-|-|
                            1 2 3 4 5 6 7 8
```

Mind the following considerations:

- Each buffer position represents 100 bytes.
- A hyphen (-) represents free space for 100 bytes in the buffer.
- An X represents 100 occupied data bytes in the buffer.
- The sender is using Slow Start.
- The segment size is MSS=100 bytes.

> **10** (0.5 points) How many bytes has the sender written in its sending buffer?

☐ **a**) 100 bytes ☐ **b**) 200 bytes ☐ **c**) 300 bytes ☐ **d**) 600 bytes

> **11** (0.5 points) How many bytes does the sender send to the receiver in its first data segment?

☐ **a**) 100 bytes ☐ **b**) 200 bytes ☐ **c**) 300 bytes ☐ **d**) 600 bytes

> **12** (0.5 points) What is the size of the sending window?

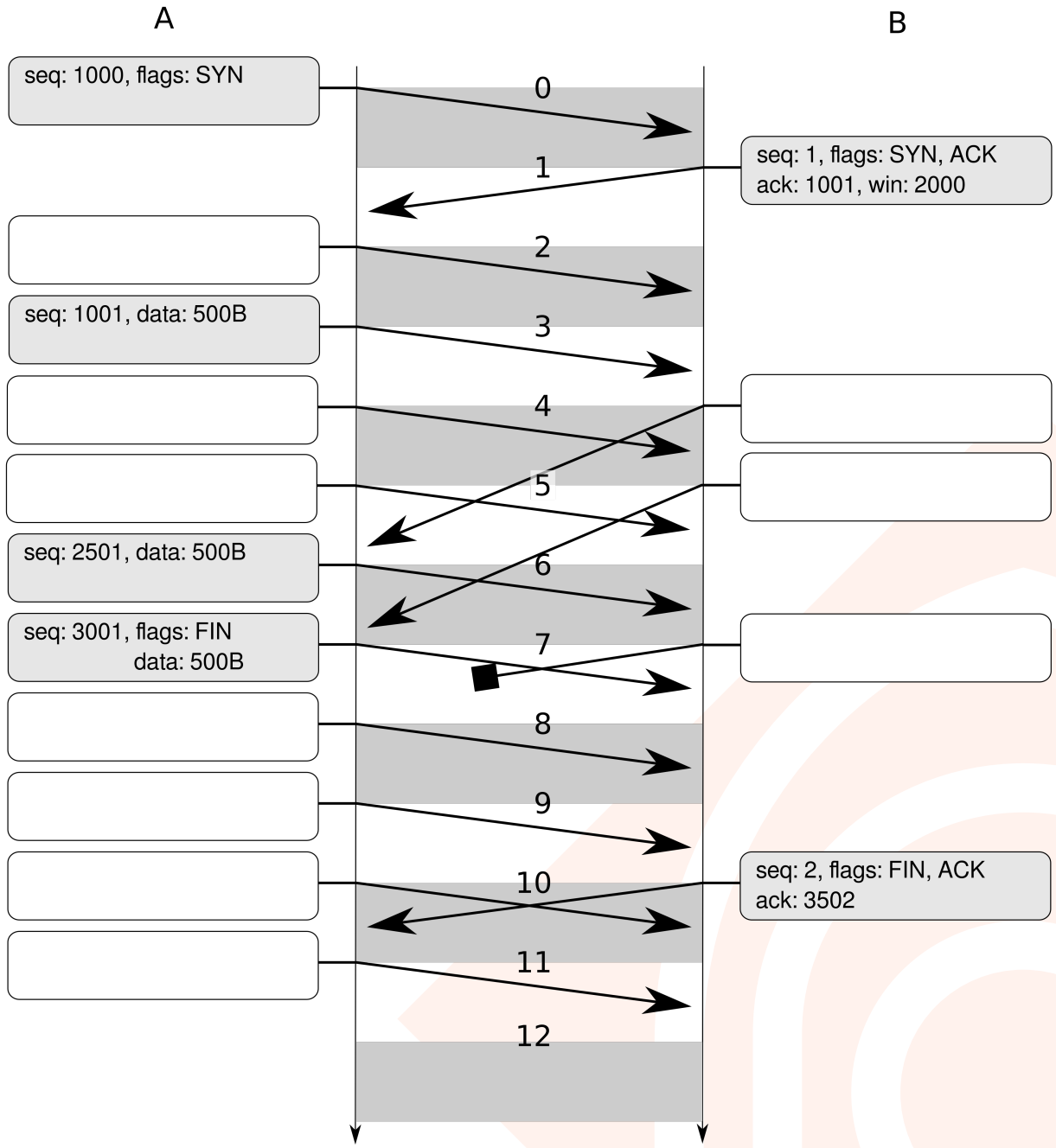
☐ **a**) 100 bytes ☐ **b**) 200 bytes ☐ **c**) 300 bytes ☐ **d**) 600 bytes

> **13** (0.5 points) Assume that the sender now receives the ACK from the receiver by confirming the sent data, what is the size of the sending window?

☐ **a**) 0 bytes ☐ **b**) 100 bytes ☐ **c**) 200 bytes ☐ **d**) 300 bytes

14 [5p] The figure shows a TCP stream, including connection and disconnection. Complete the content of the blank segments taking in mind that:

- There's no congestion control being done.
- The transmission time of A segments (timeout) is 3 clock tics.
- A uses a fixed data size of 500 bytes.
- A sends 2500 bytes and will send data segments whenever it can. B does not send data.



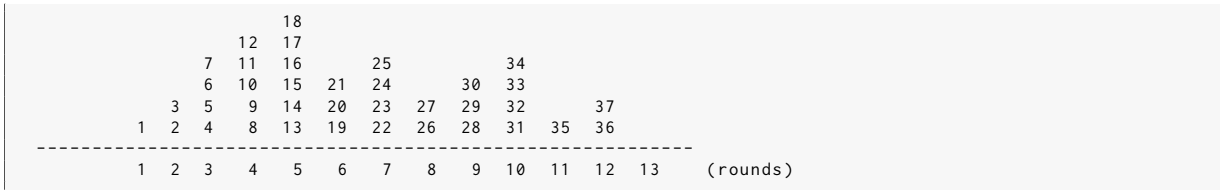
15 [1p] Indicate which of the following sentences is false about a connectionless service:

- ☐ **a)** A message is sent end-to-end without a previous agreement.
- ☐ **b)** There is no order relationship between messages sent between the end points of the communication.
- ☐ **c)** The protocol header includes a sequence number to identify the datagram.
- ☐ **d)** No error control can be implemented.

16 [1p] Which of the following fields is not part of a TCP segment?

- ☐ **a**) Checksum
- ☐ **b**) Source port
- ☐ **c**) Flow Control Label
- ☐ **d**) Receiver window size

E. [5p] Consider the following graph representing the congestion window of a TCP connection. The numbers indicate the order in which the segments are sent, but nothing about its content. Answer the following questions:



> **17** (1p) What is the value of the initial threshold (*ssthresh*) (measured in MSS)?

☐ **a**) 1 ☐ **b**) 2 ☐ **c**) 3 ☐ **d**) 4

> **18** (1p) What happened in round 5?

- ☐ **a**) The threshold has been reached.
- ☐ **b**) A timeout has expired.
- ☐ **c**) Three duplicate ACKs have been received.
- ☐ **d**) The receiver has reduced its window to 3 MSS.

> **19** (1p) What happened in round 7?

- ☐ **a**) The threshold has been reached.
- ☐ **b**) A timeout has expired.
- ☐ **c**) Three duplicate ACKs have been received.
- ☐ **d**) The receiver has reduced its window to 2 MSS.

> **20** (1p) What happened in round 10?

- ☐ **a**) The threshold has been reached.
- ☐ **b**) A timeout has expired.
- ☐ **c**) Three duplicate ACKs have been received.
- ☐ **d**) The receiver has reduced its window to 2 MSS.

> **21** (1p) If there are still data to be sent and no problem has occurred. What segments should be sent in round 13?

☐ **a**) 38 ☐ **b**) 38 to 40 ☐ **c**) 38 to 41 ☐ **d**) 38 to 43