

Solutions to selected Problems in chapter 24

P. 24.1 : $\frac{16}{16+20} = 0.444 \Rightarrow 44.4\%$

- P. 24.3 :
- a) 8 byte only header
 - b) 65515 udP is sent over IP
 - c) zero bytes
 - d) $65515 - 8 = 65507$

P. 24.5 tip: use Karn's Algorithm:
~~only~~ only use segment 2.

$$RTT_M = 23 - 6 = 17 \text{ ms}$$

$$RTT_S = (1 - 0.2) \times 14 + 0.2 \times 17 = 14.6 \text{ ms}$$

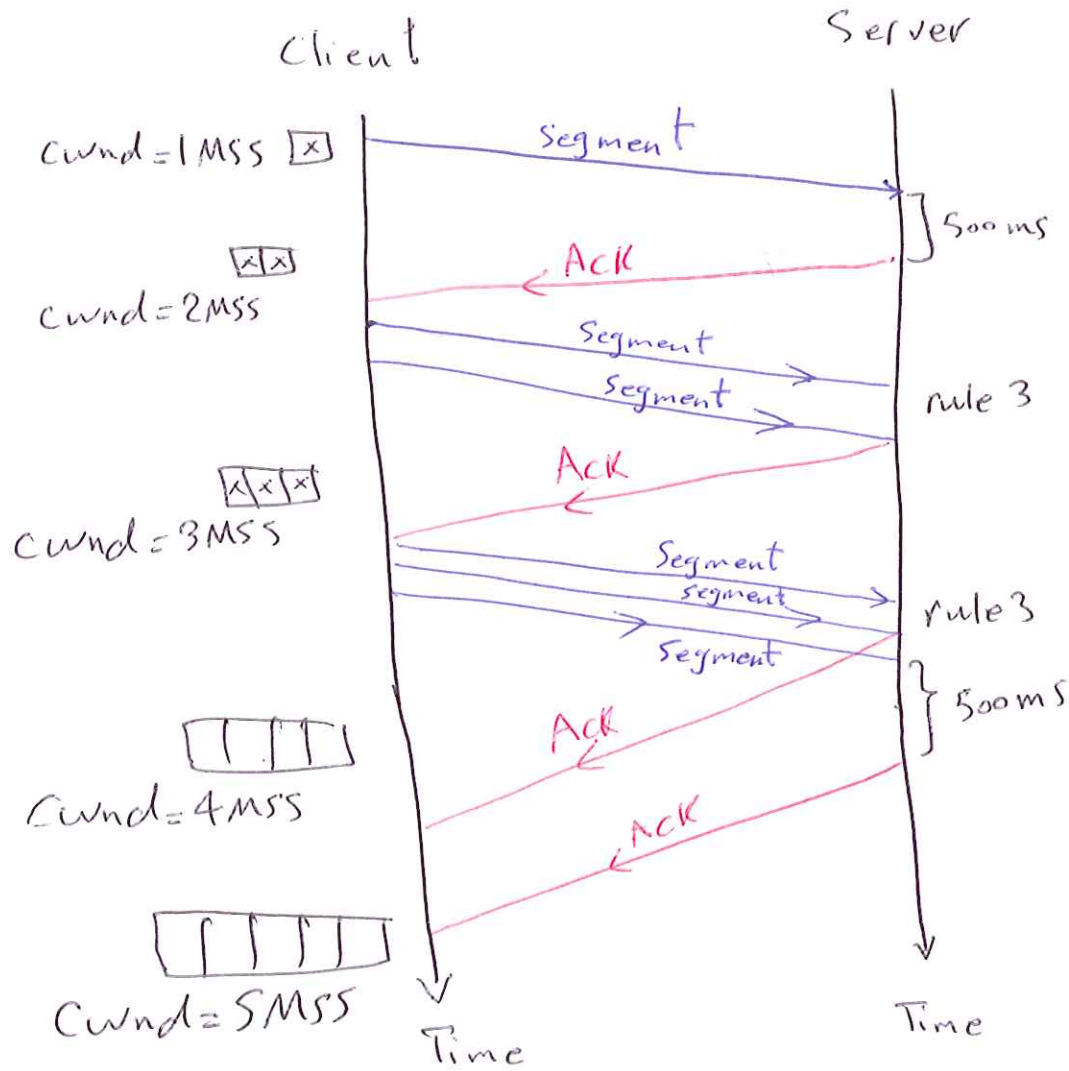
P. 24.10 it is a very unlikely event. most probably ISN for a connection is unique in TCP. Thus Alice finds out the difference between the ACKNo which she expects and the received one so she will send a reset segment and start a new connection

P. 24.13

current state	event	next state	ssthresh	cwnd
SS	Ack Arrived	SS	8	$5+1=6$
SS	Ack Arrived	SS	8	$6+1=7$
SS	Ack Arrived	CA	8	$7+1=8$
CA	3 dup ACKs	FR	4	$4+3=7$
FR	dup ACK	FR	4	$7+1=8$
FR	dup ACK	FR	4	$8+1=9$
FR	dup ACK	FR	4	4
FR	Ack Arrived	CA	4	$4 + \frac{1}{4} = 4.25$
CA	Ack Arrived	CA	4	
CA	Time out	SS	2.125	1

Problem 24.15

5400 bytes \rightarrow five chunks of 980 bytes + 20 bytes header
 one chunk of 500 bytes + 20 bytes header



Problem 24.19

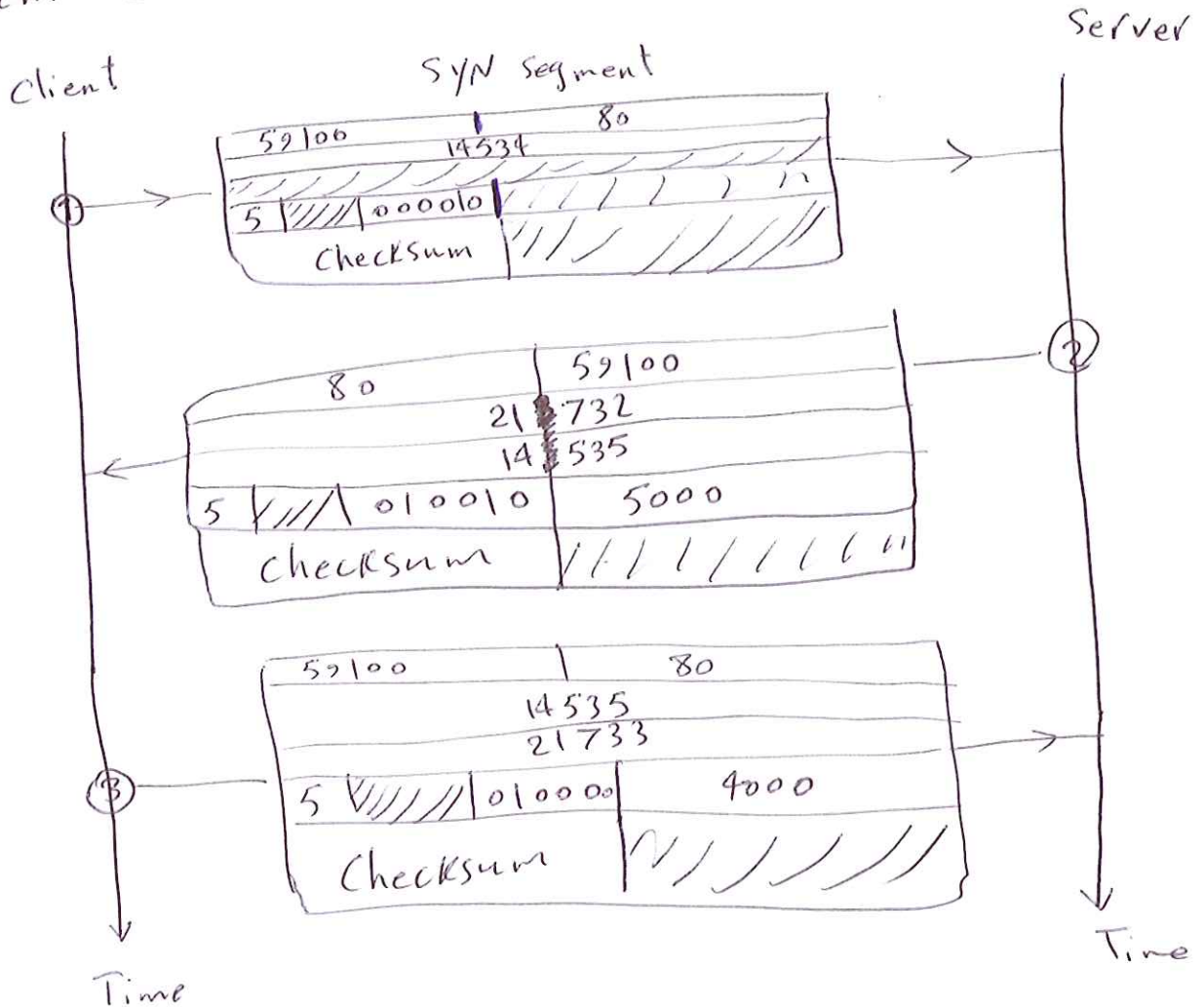
- a) 69
- b) 57088
- c) 88 bytes
- d) $88 - 8 = 80$ bytes
- e) server to client
- f) TFTP
- g) No

Problem 24.24

$$\text{Throughput} = \frac{\text{average window size}}{\text{RTT}} = \frac{\frac{(30000+6000) \times 8}{2}}{30 \times 10^{-3}}$$

= 12 Mbps

Problem 24.29.



P. 24.35

- a) 2171
- b) 2172 to 3171
- c) 3172

P. 24.36

$$\frac{(2^{32} - 1) - 7000}{1000000} = 4295 \text{ sec}$$

24.40. Window Size = $\min(3000, 5000) = 3000$

2000 bytes sent, $3000 - 2000 = 1000$ ^{bytes} can be sent.