CS341 18Fall HW4

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[Problem 1]
Although UDP is more appropriate for voice or video applications which are loss-tolerable but delay-sensitive, TCP is often used in today's internet since the firewalls mostly block UDP traffic.

[Problem 2]
Both segments will be directed to the same socket. OS determines the origins of the segments by handling IP addresses.

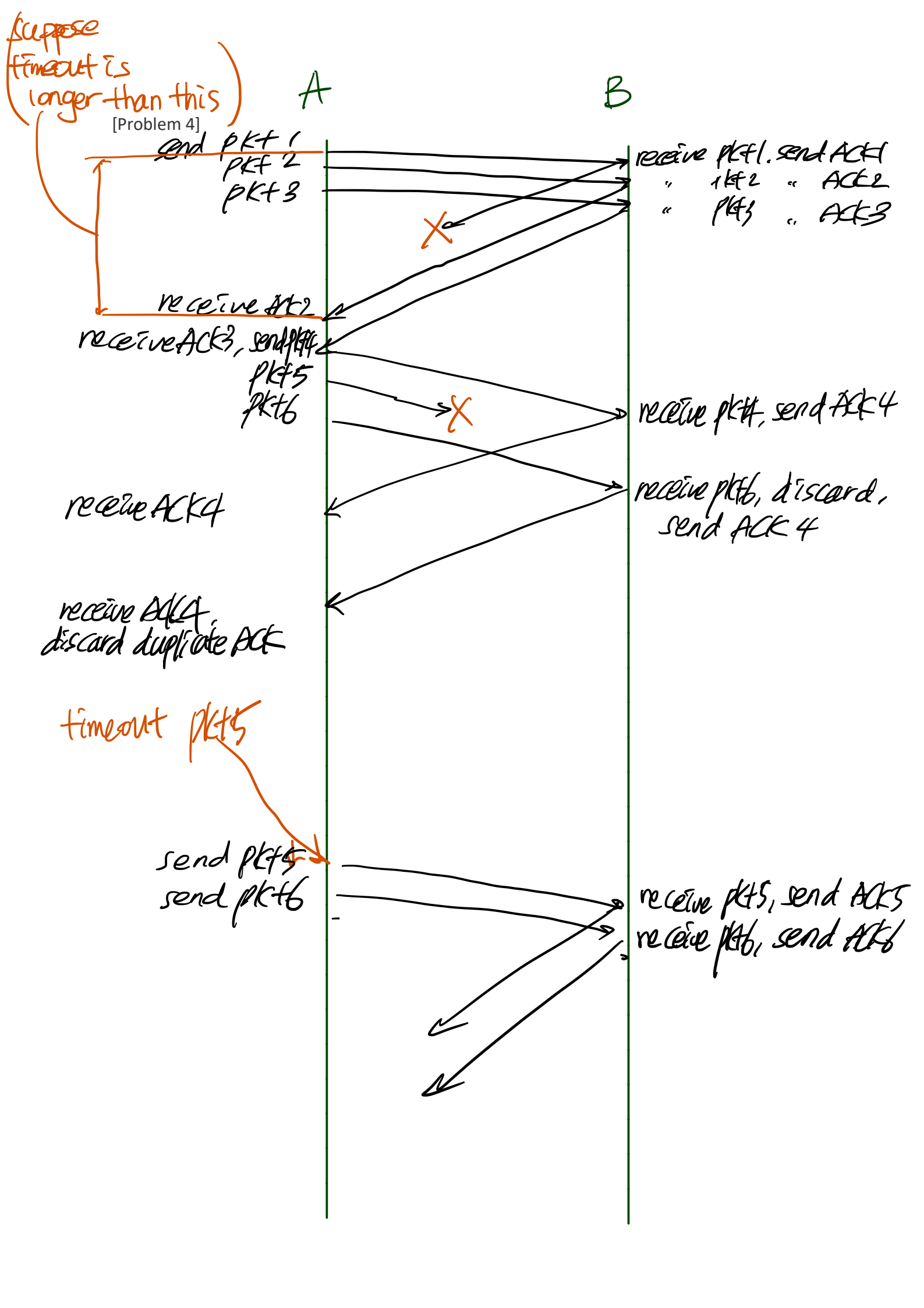
[Problem 3]
GBN: Problem in Figure 3.27 will not happen if there is no overlapping between the receiver's trailing edge and the sender's leading part. The largest window size will be k-1

SR: Problem in Figure 3.27 will not happen if the sequence number space could fit the entire receiver window and the entire sender window without overlapping.
Let w be window size and the lowest sequence number that the receiver is waiting for is m. The window is then [m, m + w - 1]

In this case, the sender window could be [m - w, m - 1] in extreme case.
(The case that all w ACKs(with value from m - w to m - 1)sent from receiver is not received by the sender)

Thus, to avoid overlapping between sender and receiver's window, k should be larger than m + w - 1 - (m - w) = 2w - 1, which means $k \geq 2w$

Thus, the largest window size will be k/2


suppose timeout is longer than this
[Problem 4]
A
B
send pkt1
pkt2
pkt3
receive pkt1, send ACK1
" pkt2 " ACK2
" pkt3 " ACK3
X
receive ACK2
receive ACK3, send pkt4
pkt5
pkt6
X
receive pkt4, send ACK4
receive pkt6, discard,
send ACK4
receive ACK4
receive ACK4,
discard duplicate ACK
timeout pkt5
send pkt5
send pkt6
receive pkt5, send ACK5
receive pkt6, send ACK6

[Problem 5]
a.
GBN
Host A: 9 Segments with sequence number 1, 2, 3, 4, 5, 2, 3, 4, 5
Host B: 8 ACKs with sequence number 1, 1, 1, 1, 2, 3, 4, 5
SR
Host A: 6 segments with sequence number 1, 2, 3, 4, 5, 2
Host B: 5 ACKs with sequence number 1, 3, 4, 5, 2
TCP
Host A: 6 segments with sequence number 1, 2, 3, 4, 5, 2
Host B: 5 ACKs with sequence number 2, 2, 2, 2, 6

b.
TCP
Host A receives three dup ACKs with the same sequence number. It first does fast retransmit rather just waits for timeout.

[Problem 6]

a. let $\frac{W}{2} = t$

$$\sum_{n=0}^{\frac{W}{2}} \left(\frac{W}{2}+n\right) = \sum_{n=0}^{t} (t+n) = t(t+1) + \frac{t(t+1)}{2}$$

$$= t(t+1)\cdot\frac{3}{2}$$

$$= \frac{3}{2}\cdot\frac{W}{2}\left(\frac{W+2}{2}\right)$$

$$= \frac{3}{8}W^2 + \frac{3}{4}W$$

$$\therefore L = \frac{1}{\frac{3}{8}W^2 + \frac{3}{4}W}$$

b.

$$\frac{3}{4}\sqrt{\frac{8}{3L}}\cdot\frac{MSS}{RTT} = \frac{3}{4}\sqrt{\frac{8}{3}}\cdot\frac{MSS}{RTT\sqrt{L}}$$

$$= \frac{\sqrt{3}}{\sqrt{2}}\cdot\frac{MSS}{RTT\sqrt{L}}$$

$$\approx 1.22\,\frac{MSS}{RTT\sqrt{L}}$$

[Problem 7]
a. [1, 6], [23, 26]

b. [6, 16], [17, 22]

c. Triple duplicate ACK. The congestion window size is not 1.

d. Timeout. The congestion window size is 1.

e. 32. At 32, slow start ends and congestion avoidance begins.

f. 21. At round 16, packet loss detected. The threshold is then half of the congestion window, which was 42.

g. 14. Same as problem (f), the loss detected at round 22 and the size of the congestion window was 29.

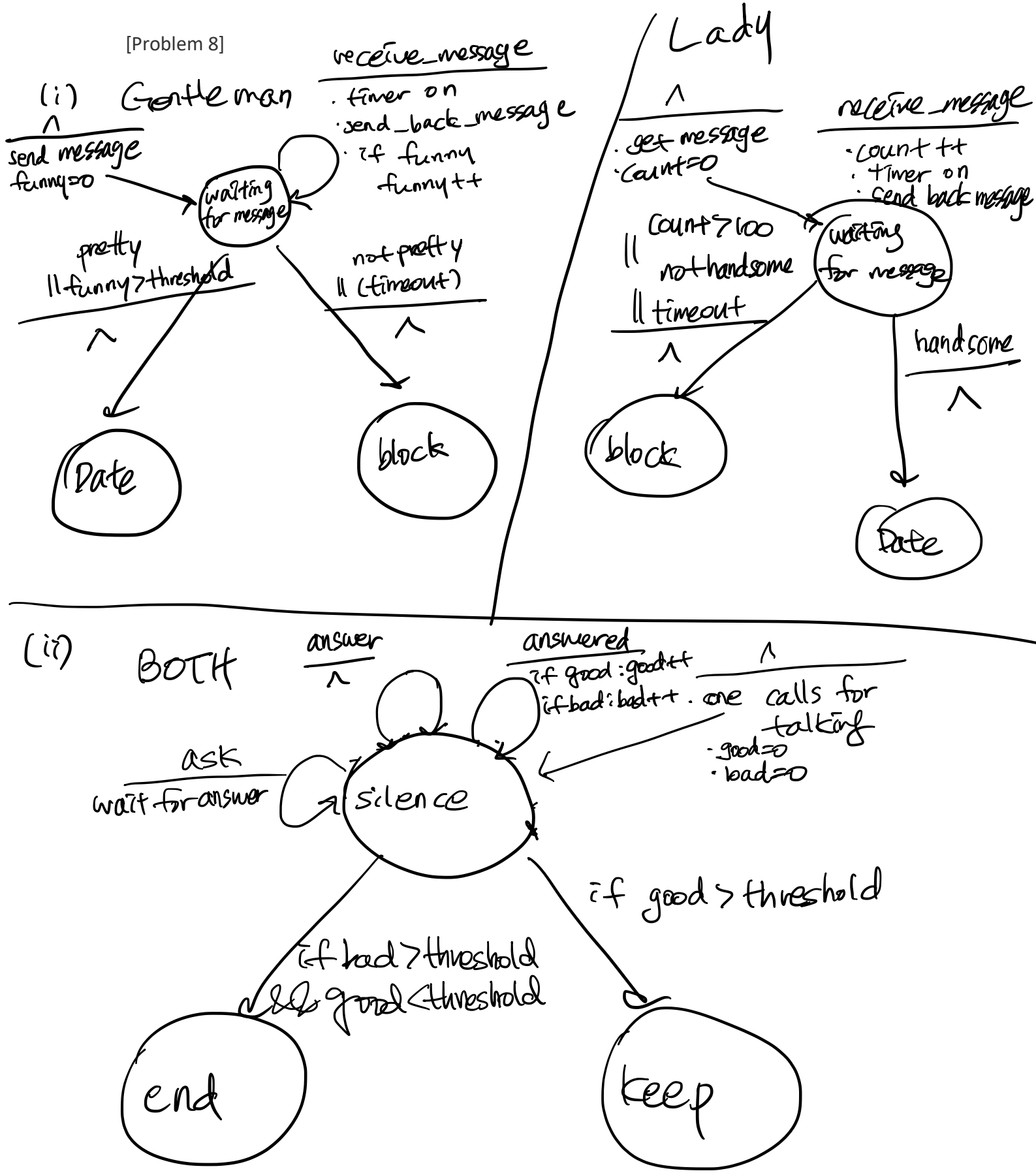
h. 7 round. Packet 1 is sent in 1 round. Packet 2^(n-1) – (2^n – 1) are sent in n round from n = 2, 3, 4, 5, 6. Packet 64 – 96 are sent in 7 round.

i. threshold is 4, window size is 7. Threshold is half of the current size, 8/2 = 4, and the congestion window will be threshold + 3, which is 7.

j. threshold is 21, window size is 1.

k. In the form of (round: the number of packet), (17: 1), (18: 2), (19: 4), (20: 8), (21: 16), (22: 21), total 52.

[Problem 8]


(i)
Gentleman
send message
funny=0
waiting for message
receive_message
· timer on
· send_back_message
· if funny
funny++
pretty
||funny>threshold
not pretty
|| (timeout)
Date
block
Lady
· get message
· count=0
receive_message
· count++
· timer on
· send back message
count>100
|| not handsome
|| timeout
waiting for message
handsome
block
Date
(ii)
BOTH
answer
answered
if good: good++
if bad: bad++
· one calls for talking
· good=0
· bad=0
ask
wait for answer
silence
if good > threshold
if bad > threshold
&& good < threshold
end
keep

[Essay]
Although they are not enough to be called as ‘toughest’, I’ve been faced many tough challenge when I study. However, the toughest challenge that I know face with is from rather unexpected part of my life. I start swimming this summer. Although I learn swimming when I was very young, like 10 years old, the basic techniques are still in my body. It is not quite difficult to do well in average amateur competition. However, as I set my goal to be the first-class swimmer in Korean amateur swimmer, I should practice and train harder. Expected, but still it is so challenging that I think of quitting the swimming. Here, my challenge is this: Not giving up even though I know that I cannot reach the record that I set. Sometimes I feel everything unmeaningful, but I know that I will regret desperately and blame myself if I give up now. Pursuing obviously impossible goal despite of the mental and physical limitation is my toughest challenge now.