1a What is the essence of Nyquist's theorem? *5pt*

1c What is the usual way to increase the maximum bit rate of a 2400 baud line? *5pt*

2a Explain why the contention period in a CSMA/CD protocol has to be 2τ, where τ is the maximum propagation time? *5pt*

2b How can you prevent, in a wireless network in which station A wants to transmit something to B, that reception of B is distorted by C, because C did not know that A was sending? *10pt*

3 ***CONSIDER THE PROTOCOL DESCRIPTION ON THE NEXT PAGE***

3a Explain what the *receiver* does, when the packet that is sent in line 12, gets lost.Maak duidelijk wat de *ontvanger* doet, als het pakket dat in regel 12 verzonden wordt, verloren raakt. *5pt*

3b Explain what the *sender* does, when the packet that is sent in line 12, gets lost. *10pt*

3c Explain what the *sender* does, when the acknowledgment for the packet that is sent in line 12, gets lost. *5pt*

Grading: *The final grade is calculated by accumulating the scores per question (maximum: 45 points), and adding 5 bonus points. The maximum total is therefore 50 points.*

```
01 void protocol4 (void) {
02   seq_nr next_frame_to_send, frame_expected;
03   frame r, s;
04   packet buffer;
05   event_type event;
06
07   next_frame_to_send = 0; frame_expected = 0;
08   from_network_layer(&buffer);
09   s.info = buffer;
10   s.seq  = next_frame_to_send;
11   s.ack  = 1 - frame_expected;
12   to_physical_layer(&s); start_timer(s.seq);
13
14   while (true) {
15     wait_for_event(&event);
16     if (event == frame_arrival) {
17       from_physical_layer(&r);
18       if (r.seq == frame_expected){
19          to_network_layer(&r.info);
20          inc(frame _expected);
21       }
22       if (r.ack == next_frame_to_send){
23          from_network_layer(&buffer);
24          inc(next_frame_to_send);
25       }
26     }
27     s.info = buffer;
28     s.seq = next_frame_to_send;
29     s.ack = 1 - frame_expected;
30     to_physical_layer(&s); start_timer(s.seq);
31   }
32 }
```