## Dept. Math. & Comp. Sc. Vrije Universiteit

## Midterm Computer Networks 02.04.2001

1a Given a 2400 baud modem, what is the maximum time to transfer a 7 KByte binary file?

5pt

1b What is frequency modulation and why is it used?

5pt

1c Explain how frequency division multiplexing works.

5pt

2a The following table shows how parity bits are used in the Hamming code. Suppose the string "000 1110 0101" is received. Which string had been sent?

5pt

	b1	b2	b3	b4	b5	b6	b7	b8	b9	b10	b11
1	X		X		X		X		X		X
2		X	X			X	X			X	X
4				X	X	X	X				
8								X	X	X	X
RECEIVED:											
	0	0	0	1	1	1	0	0	1	0	1

2b In practice, error detection schemes are used more often than error correcting schemes. Why? Give an example where error correction is preferable.

5pt

3a What is the difference between contention protocols and collision-free protocols in the MAC sublayer?

5pt

3b Explain why it is necessary to specify a maximum cable length for Ethernet networks. Be precise!

10pt

3c Explain why we need to insert delays in some token ring networks.

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.