Dept. Math. & Comp. Sc. **Midterm Computer Networks**
Vrije Universiteit **24.03.2003**

1a Can two computers that have a different implementation of the same protocol exchange messages? Explain your answer. *5pt*

1b What are the different layers of the OSI reference model, and what does each layer do? *10pt*

2a If a medium has a bandwidth of 1 MHz, what does this mean? *5pt*

2b What is the difference between amplitude modulation and frequency modulation. Why do we need such techniques? *5pt*

2c What is the purpose of a splitter in ADSL? Be precise in your answer. *5pt*

3 For a sliding window protocol, it is necessary to have the window size at most half of the range of sequence numbers. Why? *5pt*

4a Instead of using Manchester encoding, we could also use $+1$ Volt to represent a "1," and -1 Volt to represent a "0." What nice property of Manchester encoding would we lose? *5pt*

4b Explain the principle working of a virtual LAN (VLAN), assuming that only switches are used to connect (VLAN unaware) hosts. *5pt*

Grading: *The final grade is calculated by accumulating the scores per question (maximum: 45 points), and adding 5 bonus points. The maximum total MT is therefore 50 points. The final exam consists of two parts. Part 1 covers the same material as the midterm. Let $P1$ be the number of points for part 1, and $P2$ the number of points for part 2 (each being at most 50 points). The final grade E is computed as $E = \max\{MT, P1\} + P2$. The midterm exam counts only for first full exam.*