Part I

This part covers the same material as the midterm exam.

1a Explain what *out-of-band signalling* is, and why it is useful. *5pt*

1b ISDN offers two 64-kbps and one 16-kbps channel as a basic rate to customers, using time division multiplexing. How would you imagine an adaptor works that combines the three channels turning it into a full 144-kbps channel? *5pt*

1c Is Broadband ISDN *circuit-switched* or *packet-switched*? Motivate your answer. *10pt*

2a Explain how we can construct frames of arbitrary length without getting into frame-detection problems. *10pt*

2b Explain how you can have your personal computer at home work as an Internet host using *Serial Line IP*. *10pt*

2c Error correction can be done by using error-correcting codes, or combining error-detection mechanisms with frame retransmissions. Explain which method is generally more efficient under which circumstances. Motivate your answer. *5pt*

Part II

3a Explain the principle of CDMA. *10pt*

3b Explain how switched Ethernet works, and what its benefits are compared to ordinary Ethernet. *10pt*

4a Why is the transport layer often considered as one of the most important layers in the protocol hierarchy? *5pt*

4b Explain the principle of a *slow start* in TCP. *10pt*

4c Protocol processing can often be speeded up by following a *fast path* through the kernel. Explain how such a fast path is implemented. *10pt*

Final grade: *(1) Add, per part, the total points, including 5 points bonus. There are thus a maximum of 50 points per part. (2) Let T denote the total points for the midterm exam ($10 \leq T \leq 100$); $D1$ the total points for part I; $D2$ the total points for part II. The final grade E is equal to $\max\{T/2, D1\} + D2$.*