Exercise 1

A deliveryman is tasked with delivering parcels of standardized size to post boxes that can hold one parcel with plenty of space, but not two parcels. They also have a pen and plenty of notepads. There are slightly more post boxes than recipients. Each post box is labelled with two letters covering all possible combinations, e.g. AA, AB, …, AZ, BA, …, BZ, …, ZA, …, ZZ.

a) What is the total number of post boxes?
b) Each parcel is labelled with the recipients first and last name. What kind of strategy can the deliveryman and the recipients agree on so that the recipients can get their parcels with the least amount of searching?
In particular: What happens if one recipient receives more than one parcel?

Excercise 2

You are tasked with purchasing one or more new computers for private or company use, workstations at the University Computer labs, …. Name criteria you can use to evaluate computer performance.

Exercise 3

Explain the following terms: CPU, ALU, RAM, ROM, BIOS, MIPS, FLOPS?

Exercise 4

Calculate the maximum possible data transfer rate in MiB/s for a 64-bit wide bus running at 80MHz.

Exercise 5

You have a 32-bit wide bus running at 40MHz. The bus protocol takes up 10% of the bandwidth (Overhead) to assure synchronization and data integrity. What is the net data rate in MiB per second?

Exercise 6

A computer has 32 data lanes and 21 address lanes.

a) What is the word size of this device in bits or bytes respectively?
b) What is the largest possible binary number?
c) How large is the address space, e.g., how many memory cells can be addressed?
d) What is the total addressable memory in MiB assuming the memory is addressed word-wise.