# Homework 1 Internal computer architecture

1. a) A low-cost von Neumann machine has an address bus of 16 bits. In this computer, a unit of addressable memory is two bytes. How many KiB of addressable memory can be used? [1 mark]

b) (i) Explain the basic difference between von Neumann architecture and Harvard architecture. [2 marks]

(ii) Why is Harvard architecture potentially able to achieve higher processing speeds than von Neumann architecture? [1 mark]

2. I/O controllers are required to convert signals received from a peripheral device into a format the processor can understand, and vice versa.

a) Why are processors not designed to interface directly with peripheral devices? [1 mark]

b) Give **three** examples of control signals that may be carried on the control bus. [3 marks]

3. What would be the effect on the performance of a computer system in increasing each of the following? Give a brief justification for each of your answers.

a) Width of the data bus [2 marks]

b) Width of the address bus [2 marks]

[Total 12 marks]