1. (a) Explain why it is desirable to have more than one possible representation for a value. Give an example of where this might be useful in computer system design. [3]

   (b) i. Convert 158_{10} to 8-bit wide unsigned binary. [3]

   ii. Convert 1001111100100111_2 to hexadecimal. [3]

   iii. Convert 2144_{10} to octal. [4]

   iv. Explain the concept of *overflow*. Your answer should describe why the concept is relevant to computer system design. [3]

   v. Show how 18_{10} can be subtracted from 46_{10} in two's complement. [5]

   (c) Convert 2.0625_{10} to an 8-bit wide fixed point binary representation. Comment on the range of your fixed point representation. [4]