

1. (a) Explain the difference between value and representation, giving an example. [3]
- (b)
  - i. Convert  $48_{10}$  to an unsigned binary number. [2]
  - ii. Show how  $-22_{10}$  can be represented using two's complement. [2]
  - iii. Show how  $22_{10}$  can be subtracted from  $48_{10}$  using two's complement. [3]
  - iv. Explain the concept of overflow in binary arithmetic, giving an example. [3]
- (c)
  - i. Convert  $4180_{10}$  to octal. [3]
  - ii. Convert  $1111101001101011_2$  to hexadecimal. [3]
  - iii. State whether  $D2AF_{16}$  is a valid hexadecimal value. Justify your answer. [2]
- (d) Explain the difference between fixed point and floating point binary representation. Comment on the achievable precision and range of each representation. [4]