

Data Representation Test

1. Briefly describe why binary code is commonly used in computer hardware. ----- [1]
2. How many bits in a byte? ----- [1]
3. In the binary number 10101010_2 what is the value of the MSB? ----- [1]
4. Make a table counting upwards from 0 to 16_{10} in decimal, binary, octal and hexadecimal. ----- [3]
5. Briefly explain the difference between value and representation, giving an example. ----- [3]
6. Which of the following are **not** valid hex values?
 - a. FEC_{16}
 - b. $DEAD_{16}$
 - c. FUN_{16}
 - d. 1234_{16}
 - e. $EGAD_{16}$ ----- [1]
7. What is 2742_8 in binary? ----- [1]
8. Convert 1011001011111001_2 to hex. ----- [1]
9. Convert 42_{10} to binary. ----- [1]
10. Convert 73_8 to hex. ----- [1]
11. Convert 1101100100_2 to decimal. ----- [1]
12. Convert 4000_{10} to octal. ----- [1]
13. Calculate the following binary sum: ----- [1]

$$\begin{array}{r} 10100111 \\ + 01110001 \\ \hline \end{array}$$
14. Calculate the following binary sum: ----- [1]

$$\begin{array}{r} 10111 \\ + 11011 \\ \hline \end{array}$$
15. Show the binary representations for -13_{10} in
 - a. signed magnitude and
 - b. two's complement. ----- [2]
16.
 - a. Find the binary two's complement representations of $+12_{10}$ and -10_{10} .
 - b. Use your answers to subtract 10 from 12. Show your working. ----- [2]
17. Do the following statements describe fixed or floating point representations, both or neither?
 - a. It's fast
 - b. Provides the best resolution
 - c. Copes with a wide range of numbers
 - d. Implementation is complicated
 - e. Can't represent some values
 - f. Is described by an international standard
 - g. Can represent any value
 - h. Allows simple multiplication by two. ----- [4]
18. Using 4 bit binary arithmetic, illustrate overflow error with an example. ----- [1]
19. Describe IEEE 754 single precision floating point representation using a labelled diagram. ----- [3]