CM1101: COMPUTATIONAL THINKING
TUTORIAL – DATA REPRESENTATION

1. Count from 0 up to 15 in binary, octal, hexadecimal, and base 5.

2. Convert the following integers to binary:

    (a) 27_{10}

    (b) 34_{10}

    (c) 55_{10}

    (d) 451_{10}

    (e) 987_{10}

    (f) 2016_{10}

3. Convert the integers from question 2 to octal.

4. Convert the integers from question 2 to hexadecimal.

5. Convert the following numbers to binary, accurate to four binary places after point:

    (a) 18.25_{10}

    (b) 19.625_{10}

    (c) 12.125_{10}

    (d) 14.11_{10}

    (e) 2314.34_{10}

    (f) 21.97_{10}

6. Carry out the following binary arithmetic:

    (a) 101101 + 10101

    (b) 100111 – 11100

    (c) 1101110 + 111100 + 100101

7. Show how the following decimal numbers would be represented in a 12-bit register, using sign and magnitude and two's complement representation:

    (a) +14

    (b) +63

    (c) − 256

    (d) − 1032

8. Interpret the following bit pattern in the different ways requested below:

1011001110101000

(a) as four hexadecimal digits.

(b) as two 8-bit two's complement integers, interpreting your answer in decimal.

9. An 8-bit register is used to store non-negative numbers using the fixed point representation. The first 6 most significant bits of the register represent the integer part, and the remaining 2 bits represent the fractional part. What is the range of the register? What is the precision of the register?

END OF QUESTIONS