



1.4.1 Floating Point Binary

Q1

The numbers below are represented in floating point format with a 5-bit mantissa in two's complement followed by a 4-bit exponent in two's complement. Normalise the numbers shown below, showing your working.

a) 00011 0010

[2 marks]

b) 11110 0111

[2 marks]

Q2

The table below shows floating point numbers that are stored using 6 bits for the mantissa and 3 bits for the exponent, both in two's complement.

Tick one box in each row to state whether each number is normalised or not normalised

Binary Number	Normalised	Not normalised
010101 100		
110101 111		
011010 010		
101010 110		

[4 marks]

Q3

The number below is represented in floating point format with a 5-bit mantissa in two's complement followed by a 3-bit exponent in two's complement. Calculate the denary value of the number, showing your working.

01001 010

[3 marks]





Q4

The normalised floating point number 1010 1110 is stored using 4 bits for the mantissa and 4 bits for the exponent, both in two's complement.

Give the denary version of this number, showing your working.

[4 marks]

Q5

Show the denary number -5.25 in floating point binary form representing the mantissa and exponent in two's complement, using as few bits as possible. Show your working.

[4 marks]

Q6

Convert the denary number $1\frac{5}{8}$ (1.625) to a normalised floating point binary number using 5 bits for the mantissa and 3 bits for the exponent. Show your working

[4 marks]

Q7

Add together the two numbers below. Both numbers are stored in normalised floating point format, using 6 bits for their mantissa and 4 bits for their exponent which are both in two's complement.

$$\begin{array}{r} 011000 \ 0110 \\ 010100 \ 0100 \ + \\ \hline \end{array}$$

Show the result in the same format and show your working.

[5 marks]





Q8

Complete this binary subtraction. Both numbers are stored in normalised floating point format, using 6 bits for their mantissa and 4 bits for their exponent which are both in two's complement.

$$\begin{array}{r} 011010 \ 0011 \\ \underline{010010 \ 0010} \end{array} -$$

Show the result in the same format and show your working.

[6 marks]

Q9

A computer represents floating point binary number using a 6-bit mantissa and 4-bit exponent, both using two's complement.

Add the following three numbers together and give the answer in the format described.

010100 0010

011000 0001

100010 0010

You must show your working.

[6 marks]

