S1 – Examination 1
Computer Architecture

Duration: 1 hr 30 min.

Family name: .... First name: .... Class: ....

Answer on the worksheet
Do not show any calculation unless you are explicitly asked.
Do not use a pencil or red ink.

Exercise 1 (5 points)

Convert the following numbers from the source form into the destination form. Do not write down the result in a fraction or a power form (e.g. write down 0.25 and not ¼ or 2^{-2}). Write down the result only (do not show any calculation).

Number to Convert	Source Form	Destination Form	Result
11011011	Binary	Decimal	
1DB	Hexadecimal	Decimal	
147	Decimal	Binary	
524	Decimal	Hexadecimal	
11001.1011	Binary	Decimal	
25.B	Hexadecimal	Decimal	
57.48	Decimal	Binary (5 digits after the point)	
18.24	Decimal	Hexadecimal (3 digits after the point)	
DC.81	Hexadecimal	Binary	
1010100.10111	Binary	Hexadecimal	

Exercise 2 (4 points)

Perform the operations below. **Show all calculations.**

Base 2											Base 16						
		1	1	0	0	1	1	0	0	1				4	8	5	4
	–		1	1	1	1	1	1	1	1	+			C	E	B	9

Base 2													
	1	0	0	1	0	1	1	0	0	1	1	0	0

Base 2																
								1	0	1	0	1	0	1	0	1	0	0
							×		1	0	1	0	1	0

Exercise 3 (5 points)

Perform the following 8-bit binary operations (the two operands and the result are 8 bits wide). Then, convert the result into unsigned and signed decimal values. If an overflow occurs, write down 'ERROR' instead of the decimal value.

Operation	Binary Result	Decimal Value	
		Unsigned	Signed
11010011 – 10011111			
01101001 + 01101110			
01011010 – 10101110			
11001000 – 11100010			
01101111 + 10000001			

Exercise 4 (6 points)
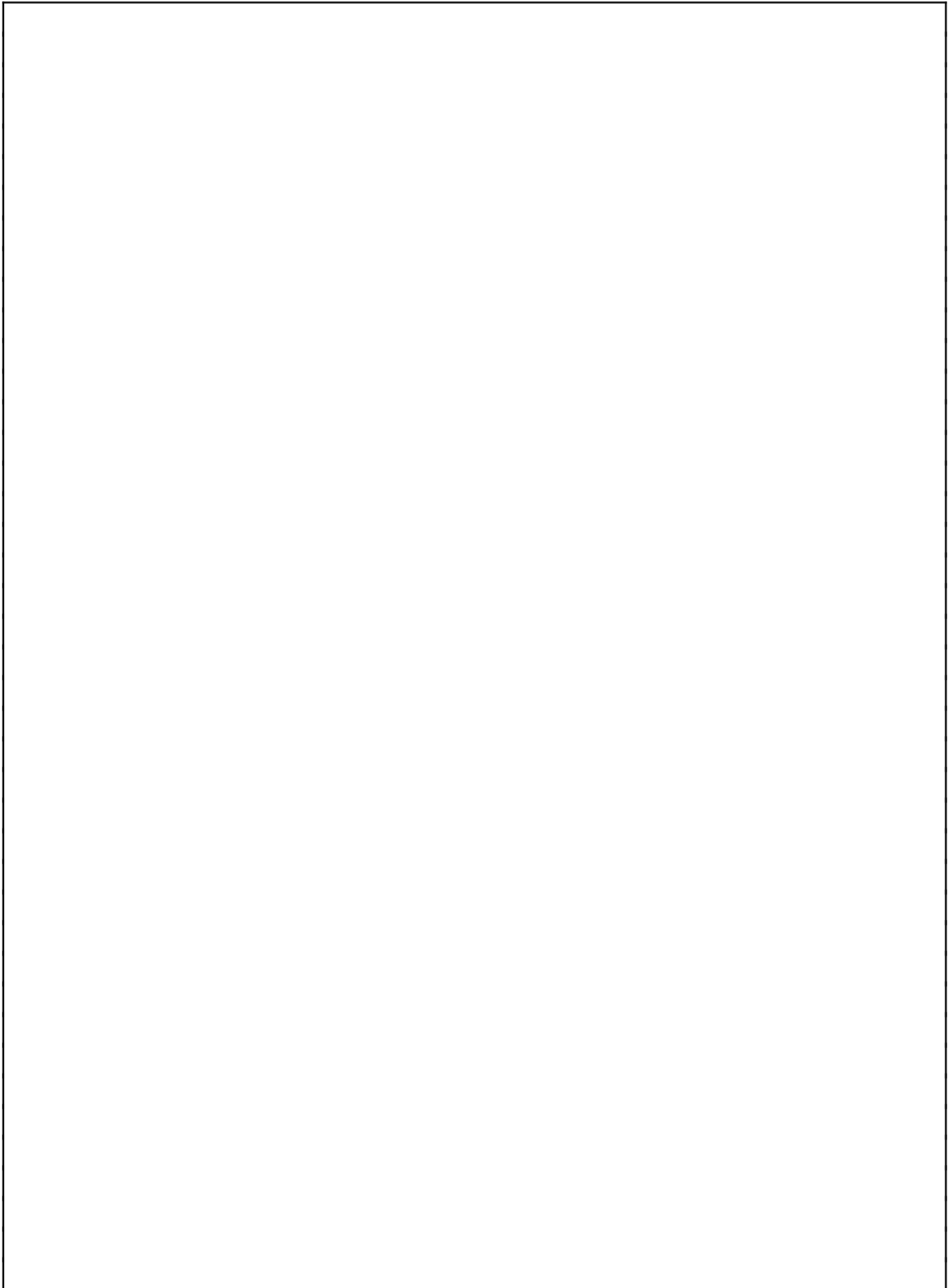
1. Convert the numbers below into their **single-precision** IEEE-754 representations. Write down the final result in its **binary form** and specify the three fields.

Number	S	E	M
325			
67.375			
0.6875			

2. Convert the **double-precision** IEEE-754 words below into their associated representations. If a representation is a number, use the base-10 following form: $k \times 2^n$ where k and n are integers (either positive or negative).

IEEE-754 Representation (base 16)	Associated Representation
3548 0000 0000 0000	
000A 8000 0000 0000	
FFFF 0000 0000 0000	

Feel free to use the blank space below if you need to: