Homework3

1 . **Suppose all the numbers are 8-bit long. Give the result of the following expressions of C language in full 8-bit 2's complement form and signed decimal form.**

Expression	2's-complement	Signed 8-bit Decimal
3+2	0000 0101	5
99/2		
(-23)/2		
-127-1		
125+3		
125>>3		

2. **The following C code pieces are executed on a typical 32-bit machine with 2's complement encoding. Please give the output and show how you can get the result in detail.**

```
int main()
{
int x = 257;
char y = -10;
int z = 128;
char a = (char)x;
short b =(short)y;
unsigned short d = (unsigned short)b;
char c = (char)z;
unsigned int e = (c > 0) ? 0 : 1;
int f = ((unsigned) z<<24)>>24;
Int g =(z<<24)>>24;
printf("a=%d,b=%d,d=%x,c=%d,e=%d,f=%d,g=%d\n",a,b,d,c,e,f,g);
}
```

3.

Consider a **16-bit** floating-point representation based on the IEEE floating-point format, which is illustrated below.

S	E	E	E	E	E	E	F	F	F	F	F	F	F	F	F

1. Filling the blanks with proper values.

   1) The denormalized values can be represented in a form
      $V = (-1)^{sign} * (0.\textbf{fraction}) * 2^E$, where E = ____[1]____;

   2) The normalized values can be represented in a form
      $V = (-1)^{sign} * (1.\textbf{fraction}) * 2^{(e - bias)}$, where **bias** = ____[2]____,
      and the value of e ranges from ____[3]____ to ____[4]____.

2. Give the equivalent value of the following numeric numbers or FP representation.

Numeric value	FP representation (in hex)
$(12.625)_{10}$	(0x **[1]**)$_{16}$
$(-0.09375)_{10}$	(0x **[2]**)$_{16}$
[3]	$(0x4C18)_{16}$
[4]	$(0x7EB0)_{16}$

3. Calculate both the **sum** and **multiplication** of $(12.625)_{10}$ and $(0x4C18)_{16}$, and then round the results to **5** bits to the right of the binary point with **Round-to-Even** rounding modes. Give your steps detailed.