Homework #5 — Due 11/9/98

1. Perform the following arithmetic operations in 5-bit two's complement arithmetic, showing your work:

```
    6     00110
+   7   + 00111
          01101 = 13

    6     00110     00110
–   7   – 00111   + 11001
                    11111 = -00001 = -1

    6     00110     00110
+  -4   – 00100   + 11100
                    1)00010 = 2 (ignore carry)

   -2     -00010    11110
– -5    – -00101   + 00101
                    1)00011 = 3  (ignore carry)
```


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2. Convert to IEEE 754 floating point single precision format, showing your work as you convert between decimal and binary:

- –18.375

18 / 2 = 9, rem 0 — 2 / 2 = 1, rem of 0
9 / 2 = 4, rem of 1 — 1 / 2 = 0, rem of 1
4 / 2 = 2, rem of 0
0.375 * 2 = 0.75
0.75 * 2 = 1.5
0.5 * 2 = 1.0

Therefore, $-18.375_{10} = 10010.011_2$
$= 1.0010011_2 \times 2^4$
$= 1.0010011_2 \times 2^{131-127}$

131 / 2 = 65, rem 1 — 8 / 2 = 4, rem of 0
65 / 2 = 32, rem 1 — 4 / 2 = 2, rem of 0
32 / 2 = 16, rem 0 — 2 / 2 = 1, rem of 0
16 / 2 = 8, rem 0 — 1 / 2 = 0, rem of 1

Therefore, $131_{10} = 10000011_2$

Giving –18.375 in IEEE floating point:
1 10000011 00100110000000000000000