Problem Session 2: Signed Integers and Floats
February 3, 2021

1. Consider a **5-bit** two's complement representation. Fill in the empty boxes in the following table. Addition and subtraction should be performed based on the rules for 5-bit, two's complement arithmetic

Number	Decimal Representation	Binary Representation
n/a	9	01001
n/a	-14	10010
n/a	12	01100
n/a	-12	10100
TMax	15	01111
TMin	-16	10000
TMin+TMin	0	00000
TMin+1	-15	10001
TMax+1	-16	10000
$-$TMax	-15	10001
$-$TMin	-16	10000

2. The following procedure takes a single-precision floating point number in IEEE format and prints out information about what category of number it is. Fill in the missing code so that it performs this classification correctly.

```
void classify_float(float f){
    /* Unsigned value  u has same binary representation as  f */
    unsigned u = *(unsigned *) &f;

    /* Split  u into the different parts */
    int sign = _____;      // The sign bit

    int exp  = _____;      // The exponent field

    int frac = _____;      // The fraction field

    /* The remaining expressions can be written in terms of the
    values of  sign,  exp, and  frac */

    if (_____){
        printf("Plus or minus zero\n");

    } else if (_____){
        printf("Nonzero, denormalized\n");

    } else if (_____){
        printf("Plus or minus infinity\n");

    } else if (_____){
        printf("NaN\n");

    } else if (_____){
        printf("Greater than -1.0 and less than 1.0\n");

    } else if (_____){
        printf("Less than or equal to -1.0\n");

    } else
        printf("Greater than or equal to 1.0\n");
    }
}
```