1. Perform the following divisions in binary and get the quotient and remainder. **Hint:** if you already have the answer for the unsigned division, you just need to consider the sign separately. If the Quotient or reminder turn out to be negative, please represent them as 2's complement.

a. 100/7 `= 0111|01100100 = Q: 01110 R: 010`

b. (-100)/7 `= 0111|10011100 = Q: 10010 R: 10`

c. 200/9 `= 01001|011001000 = Q: 010110 R: 010`

d. (-200)/(-9) `= 10111|100111000 = Q: 010110 R: 010`

e. 200/(-9) `= 10111|011001000 = Q: 101010 R: 10`

2. Find the modulo of the following numbers:

a. 30 mod5 `= 0`

b. 33 mod 7 `= 5`

c. -21 mod4 `= 3`

d. -24 mod 6 `= 0`

3. Find x in the following equations (x represent the reciprocal of the number)

a. $4x \bmod 5 = 1$ `x = 4`

b. $5x \bmod 7 = 1$ `x = 4`

4. Perform the following multiplications using the simple two's complement 4-bit floating point representation that was covered in class. Make sure that your final answer is represented as a normalized fraction. If your final exponent is out of range you have to indicate an overflow. Please note that internally fractions are allowed to be un-normalized and exponents are allowed to overflow, but not the final answer. After the calculation is done, make sure to compare your results with the correct answer (calculated in base 10) and comment on precision:

- $(-1 \times 2^{-4}) \times (-1 \times 2^{-5})$
- $(0.5 \times 2^{5}) \times (0.5 \times 2^{3})$
- $(0.875 \times 2^{3}) \times (0.875 \times 2^{3})$
- $(0.875 \times 2^{3}) \times (-0.875 \times 2^{3})$

```
i'll be honest, everything after this point
i don't fully understand.  I can do the
multiplication and adddition normally but
I don't know what most of this means.
```

5. Perform the following additions using the simple two's complement 4-bit floating point representation that was covered in class. Make sure that your final answer is represented as a normalized fraction. If your final exponent is out of range you have to indicate an overflow. Please note that internally fractions are allowed to be un-normalized and exponents are allowed to overflow, but not the final answer. If the result was zero make sure to set your output to the right value. After the calculation is done, make sure to compare your results with the correct answer (calculated in base 10) and comment on precision:

- $(-1 \times 2^{-4}) + (-1 \times 2^{-5})$
- $(-1 \times 2^{-4}) - (-1 \times 2^{-5})$
- $(0.5 \times 2^{-3}) + (0.5 \times 2^{-4})$
- $(0.5 \times 2^{3}) + (0.5 \times 2^{5})$

6. Using IEEE 754, find the floating-point representation of the numbers below in single and double precisions:

- 4
- -6

`have a nice day,`

`because i am not.`