

HW 4. Data representations and operations

Prob 4-1 (30 points total, 5 points each) Convert the following signed integers to the THREE signed binary representations: (i) sign-and-magnitude, (ii) one's complement (OC), and (iii) two's complement (TC) expressions, respectively, using a 6-bit system:

- -8
- $+18$

Prob 4-2 (20 points total, 5 points each) Consider the TC expression of the two number of the previous problem. Determine the results (in both binary and decimal forms) of the following shift operations of each of these two numbers: (i) shift to left by ONE bit and (ii) shift to the right by TWO bits.

Prob 4-3 (40 points total, 10 points each) We have learned before that we can express real numbers using the fixed-point expression. Convert the following real numbers into Q3.4 representation:

- $A_1 = 0.5$
- $A_2 = 2.25$
- $A_3 = 6.725$
- $A_4 = -4.5$

Prob 4-4 (20 points total, 10 points each) Convert the following Q3.4 representations back to real numbers:

- 0b0111_0111
- 0b1010_1010