

(5 pts) Exercise 3-1

- Assume we have 4 bits. Convert the given decimal numbers to the stated binary representations.

	5	-7
Unsigned		
Sign Magnitude		
One's Comp.		
Two's Comp.		

(5 pts) Exercise 3-2

- Convert the given decimal numbers to the stated binary representations.

	-3 (using 4 bits)	-3 (using 6 bits)
Sign Magnitude		
One's Comp		
Two's Comp.		

(5 pts) Exercise 3-3

- Assume the following is in binary two's complement form. What do they represent in decimal?

001011

111011

- Now negate these numbers and show the new binary form:

-(001011) =

-(111011) =

(10 pts) Exercise 3-6

- Suppose we use 8 bits to represent a two's complement binary number. What is the largest number that can be represented (give answer in binary AND decimal)

- What is the smallest number that can be represented (give binary AND decimal)

(5 pts) Exercise 3-11

- Do the following assuming 6 bit, two's complement numbers.
When does overflow occur?

$$\begin{array}{r} 010101 \\ + 001101 \\ \hline \end{array}$$

$$\begin{array}{r} 111111 \\ + 111101 \\ \hline \end{array}$$

$$\begin{array}{r} 010011 \\ + 001110 \\ \hline \end{array}$$

$$\begin{array}{r} 010011 \\ + 111110 \\ \hline \end{array}$$

(5 pts) Exercise 3-12

- Do the following assuming 6 bit, two's complement numbers.
When does overflow occur? (note subtraction here)

$$\begin{array}{r} 011101 \\ - 100101 \\ \hline \end{array}$$

$$\begin{array}{r} 111111 \\ - 111101 \\ \hline \end{array}$$

$$\begin{array}{r} 010011 \\ - 001110 \\ \hline \end{array}$$

$$\begin{array}{r} 010011 \\ - 111110 \\ \hline \end{array}$$

(10 pts) Exercise 3-16

(You COULD use a calculator for these. But recommended not – you should be able to do this by hand on an exam, where calculators are not permitted).

Convert 257_{ten} into a 32-bit two's complement binary number.

- Convert -37_{ten} into a 32-bit two's complement binary number.

(10 pts) Exercise 3-17

(You COULD use a calculator for these. But recommended not – you should be able to do this by hand on an exam, where calculators are not permitted).

What decimal number does this two's complement binary number represent?

1111 1111 1111 1111 1111 1111 0000 0110_{two}

What decimal number does this two's complement binary number represent?

0000 0000 0000 0000 0000 0000 0001 0110_{two}