

# EE365 - Microprocessors

## #2

### Number Representations

period 2  
08/29/03  
D. R. Schertz



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### Number Representations



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### Binary to Decimal

- ◆ 8 bit
- ◆ 2's Complement (Integer Part)
- ◆ Positional Notation

$$\begin{array}{cccccccc} 1 & 0 & 1 & 0 & 1 & 0 & 1 & 0 \\ -2^7 & 2^6 & 2^5 & 2^4 & 2^3 & 2^2 & 2^1 & 2^0 \\ -128 & + 32 & + 8 & + 2 & = & -86 \end{array}$$



### Binary to Decimal

- ◆ 8 bit
- ◆ Pure Fraction
- ◆ Positional Notation

$$\begin{array}{cccccccc} . & 1 & 0 & 1 & 0 & 1 & 0 & 1 & 0 \\ 2^{-1} & 2^{-2} & 2^{-3} & 2^{-4} & 2^{-5} & 2^{-6} & 2^{-7} & 2^{-8} & 2^{-9} \\ 1/2 & + 1/8 & + 1/32 & + 1/128 \\ .5 & + .125 & + .03125 & + .0078125 & = & 0.6640625 \end{array}$$



### Decimal to Binary

- ◆ Unsigned Binary (Integer Part)

$$\begin{array}{r} 2 \ ) \ 80 \\ 2 \ ) \ \underline{40} \ r \ 0 \\ 2 \ ) \ \underline{20} \ r \ 0 \\ 2 \ ) \ \underline{10} \ r \ 0 \\ 2 \ ) \ \underline{5} \ r \ 0 \\ 2 \ ) \ \underline{2} \ r \ 1 \\ 2 \ ) \ \underline{1} \ r \ 0 \\ \quad \quad 0 \ r \ 1 \end{array} \qquad 01010000.$$



## Decimal to Binary

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### ◆ Unsigned Binary (Pure Fraction)

	.8125
	x2
1	.625
	x2
1	.25
	x2
0	.5
	x2
1	.0

**.11010000**

