

# EE365 - Microprocessors

## #2

### Number Representations

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



Copyright 2003

Bradley University

-All Rights Reserved-

Unauthorized Duplication is Prohibited



# EE365 - Microprocessors

## #2

### Number Representations



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



### 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)

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



## Decimal to Binary

---

### ◆ Unsigned Binary (Pure Fraction)

.11010000

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

