

# INTD 290: Number Systems in Pre-Columbian Context.

## Intro to Digits and Bases

1) D: 4

2) B

3) A

4)  $225 = 2 \times 10^2$   
 $+ 2 \times 10^1$   
 $+ 5 \times 10^0$

## Base-2 or Binary

1)  $10000 = 1 \times 10^4$   
 $+ 0 \times 10^3$   
 $+ 0 \times 10^2$   
 $+ 0 \times 10^1$   
 $+ 0 \times 10^0$

2)  $352 = 3 \times 10^1 + 2 \times 10^0$   
 $= 1 \times 2^5 + 0 \times 2^4 + 0 \times 2^3 + 0 \times 2^2 + 0 \times 2^1 + 0 \times 2^0$

$32/2 = 16 \text{ r } 0$      $8 \div \boxed{32} \div 2 \div 0$

$16/2 = 8 \text{ r } 0$

$8/2 = 4 \text{ r } 0$

$4/2 = 2 \text{ r } 0$

$2/2 = 1 \text{ r } 0$

$1/2 = 0 \text{ r } 1$

100000

b)  $1001 = 1 \times 10^3$   
 $+ 0 \times 10^2$   
 $+ 0 \times 10^1$   
 $+ 1 \times 10^0$

c)  $1101 = 1 \times 10^3$   
 $1 \times 10^2$   
 $0 \times 10^1$   
 $1 \times 10^0$

b)  $42 = 1 \times 2^5 + 0 \times 2^4 + 1 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 0 \times 2^0$   
 $42/2 = 21 \text{ r } 0$   
 $21/2 = 10 \text{ r } 1$   
 $10/2 = 5 \text{ r } 0$   
 $5/2 = 2 \text{ r } 1$   
 $2/2 = 1 \text{ r } 0$   
 $1/2 = 0 \text{ r } 1$

$2 \times 2^0$

$0.5$   
 $2 \sqrt{10}$

$10$   
 $2 \sqrt{21}$   
 $-20$   
 $1$

$2$   
 $2 \sqrt{5}$   
 $-4$   
 $1$



$$\begin{array}{r} 2 \overline{) 11} \\ -10 \\ \hline 1 \end{array}$$

$$c) 11 = \boxed{1} \times 2^3 + \boxed{0} \times 2^2 + \boxed{1} \times 2^1 + \boxed{1} \times 2^0 = \boxed{11}_{0101} \times 0 = 25_{10}$$

$$11/2 = 5 \text{ r } 1 \quad 8 + 0 + 2 + 1 = 11$$

$$5/2 = 2 \text{ r } 1$$

$$2/2 = 1 \text{ r } 0$$

$$1/2 = 0 \text{ r } 1$$

$$d) 17 = 1 \times 2^4 + 0 \times 2^3 + 0 \times 2^2 + 0 \times 2^1 + 1 \times 2^0 = 16 + 0 + 0 + 0 + 1 = 17$$

$$\begin{array}{r} 2 \overline{) 17} \\ -16 \\ \hline 1 \end{array}$$

$$17/2 = 8 \text{ r } 1$$

$$8/2 = 4 \text{ r } 0$$

$$4/2 = 2 \text{ r } 0$$

$$2/2 = 1 \text{ r } 0$$

$$1/2 = 0 \text{ r } 1$$

### Base-16 or Hexadecimals

$$1) B: C$$

$$2) a) 255/16 = 15 \text{ r } 15$$

$$15/16 = 0 \text{ r } 15$$

$$255 = 15 \times 16^1 + 0 \times 16^0$$

$$255 = 225 + 30$$

$$= 255$$

### Base-20 systems

$$1) 1, 2, 3, 4, 5, 6, 7, 8, 9$$

A B C D E F G H I

$$a) a) 20 = 0 \times 20^2 + 1 \times 20^1 + 0 \times 20^0$$

$$= 0 \times 20 + 20$$

$$= 20$$

$$b) 400 = 1 \times 20^2 + 0 \times 20^1 + 0 \times 20^0$$

$$c) 401 = 1 \times 20^2 + 0 \times 20^1 + 1 \times 20^0$$

$$= 401$$



$$2) a) 25 = 0 \times 20^2 + 1 \times 20^1 + 5 \times 20^0 \\ = 25$$

$$b) 45 = 0 \times 20^2 + 2 \times 20^1 + 5 \times 20^0 \\ = 45$$

$$c) 425 = 1 \times 20^2 + 1 \times 20^1 + 5 \times 20^0$$

$$d) 625 = 1 \times 20^2 + 11 \times 20^1 + 5 \times 20^0 \\ = 625$$

$$3) a) 25 = \begin{array}{|c|} \hline \cdot \\ \hline \end{array}$$

$$b) 45 = \begin{array}{|c|} \hline \cdot \\ \hline \cdot \\ \hline \end{array}$$

$$c) 425 = \begin{array}{|c|} \hline \cdot \\ \hline \cdot \\ \hline \cdot \\ \hline \end{array}$$

$$d) 625 = \begin{array}{|c|} \hline \cdot \\ \hline \cdot \\ \hline \cdot \\ \hline \cdot \\ \hline \end{array}$$