INTD 290: Number Systems in Pre-Columbian Context.
Intro to Digits and Bases

1) D: 4
2) B
3) A
4) 225 = 2 × 10^2
+ 2 × 10^1
+ 5 × 10^0

Base-2 or Binary

1) a) 1000 = 1 × 10^3
+ 0 × 10^0
+ 0 × 10^0
+ 0 × 10^0

b) 1001 = 1 × 10^3
+ 0 × 10^0
+ 0 × 10^0
+ 1 × 10^0

c) 1101 = 1 × 10^3
1 × 10^2
0 × 10^0
1 × 10^0

2) a) 32 = 3 × 10^1 + 2 × 10^0
= 1 × 2^5 + 0 × 2^4 + 0 × 2^3 + 0 × 2^2 + 0 × 2^1 + 0 × 2^0
32/2 = 16 r 0 8 + 32 + 2 + 0
16/2 = 8 r 0
8/2 = 4 r 0
4/2 = 2 r 0
2/2 = 1 r 0
1/2 = 0 r 1
100000

b) 42 = 1 × 2^5 + 0 × 2^4 + 1 × 2^3 + 0 × 2^2 + 1 × 2^1 + 0 × 2^0
42/2 = 21 r 0
21/2 = 10 r 1
10/2 = 5 r 0
5/2 = 2 r 1
2/2 = 1 r 0
1/2 = 0 r 1

0.5
2|1.0

10
2|21
-20
1

2
2|5
-4
1

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

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

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

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

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

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

$= 16 + 0 + 0 + 0 + 1 = 17$

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

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

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

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

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

Base-16 or Hexadecimals

1) B : C

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

$15/16 = 0 \text{ r } 1$

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

$255 = 225 + 0$

$= 225$

Base-20 systems

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

A B C D E F G H I

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

$= 0 + 20 + 0$

$= 20$

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

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

$= 401$

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

$8 + 0 + 2 + 1 = 11$

$11/2 = 5 \text{ r } 1$

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

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

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

$2\overline{)11}$ (5), -10, 1

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

$= 16 + 0 + 0 + 0 + 1 = 17$

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

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

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

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

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

$2\overline{)17}$ (8), -16, 1

Base-16 or Hexadecimals

1) B : C

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

$15/16 = 0 \text{ r } 1$

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

$255 = 225 + 0$

$= 225$

Base-20 systems

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

A B C D E F G H I

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

$= 0 + 20 + 0$

$= 20$

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

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

$= 401$