MY CHOICE
Date
Page No.

* Counting

Lecture 2

	Base 2	Base 3	Base 4
0	0	0	0
1	1	1	1
2	10	2	2
3	11	10	3
4	100	11	10
5		12	11
6		20	12
7		21	13
8		22	20
9		100	21
10			22
11			23
12			30
13			31
14			32
			33
			100

If you want to represent the base itself of any number it should be (10) ~~anybase~~

* Conversion

$(25.625)_{10} \longrightarrow 11001.101$

2	25	
2	12	1
2	6	0
2	3	0
2	1	1
	0	1

.625
× 2
1.250
× 2
0.500
× 2
1.0

✓The Good Paper

→ Divide by x before point
Multiply by x after point

$(36.5)_{10} \longrightarrow (1100.\overline{1})_3$

3	36
3	12 0 ↑
3	4 0
3	1 1
	0 1 1

1100

$.5$
3
1.5
3
1.5

$(2.6)_{10} \longrightarrow (10.\overline{1001})$

2	2
2	1 0 ↑
	0 1

$.6$
2
1.2
$\times 2$
0.4
$\times 2$
0.8
$\times 2$
1.6

$(189.75)_{10} = ()_{32}$

32	189	
32	5	29 ↑
	0	5

$(5\ 29.24)_{32}$

$75 = \frac{3}{4} \times \frac{8}{32}$

2 $(\ )_x \longrightarrow (\ )_{10}$

$(11.001 \cdot 101)_2$ —

$1\times2^4 + 1\times2^3 + 0\times2^2 + 0\times2^1 + 1\times2^0 \quad 1\times2^{-1} + 0\times2^{-2} \times 1\times2^{-3}$

25.625

$(1090)_3$ — to base 10

$1 \cdot 0 \quad 2 \quad 0$

$3^3 \quad 3^2 \quad 3^1 \quad 3^0$

$27 + 6$ — $(33)_{10}$

$(36)_x = (30)_{10}$

$3\times x^1 + 6\times x^0 = 30$

$3x + 6 = 30$

$3x = 24$

$x = 8$

$(x1)_y = (36)_{10}$

Find x & y

$x*y^1 + *y^0 = 36$

$xy + 1 = 36$

$xy = 35$

$x \quad y$

$7 \times 5 = 35$

$5 \times 7 = 35$

$1 \times 35 = 35$

$35 \times 1 = 35$

2 ←

digit should be less than it base Hence $x < y$

$(\ )_x$ — $(\ )_y$

$(\ )_{10}$

(2)

✓The Good Paper

$(212.13)_4 \rightarrow (\ )_5$

$\searrow \quad \nearrow$

$(\ )_{10}$

$$\begin{matrix} 2 & 1 & 2 & . & 1 & 3 \\ 4^2 & 4^1 & 4^0 & . & 4^{-1} & 4^{-2} \end{matrix}$$

$$32 + 4 + 2 + \frac{1}{4} + \frac{3}{16}$$

$(38.4375)_{10}$

5	38	
5	7	3
5	1	2
	0	1

$.4375 \times 5 = \underline{2}.1875$

$\times 5 = \underline{0}.9375$

$\times 5 = \underline{4}.6875$

$\times 5 = \underline{3}.4375$

$\times 5 = \underline{2}.1875$

~~3 12.20432~~

123.2043

Converting in base 10 to verify

$$\begin{matrix} 1 & 2 & 3 \\ 5^2 & 5^1 & 5^0 \end{matrix}$$

$25 + 10 + 3$

$= 38$

$$\begin{matrix} 2 & 0 & 4 & 3 \\ 5^{-1} & 5^{-2} & 5^{-3} & 5^{-4} \end{matrix}$$

$$\frac{2}{5} + 0 + \frac{4}{125} + \frac{3}{625}$$

$38 + 0.4 + 0.032 + 0.0048 = (38.4368)_{10}$

- $(101)_2$ — $(\ )_3$

  1 0 1

  2^2 2^1 2^0

  $4+1 = (5)_{10}$

3	5
3	1 2 ↑
	0 1

  $(12)_3$ Ans

- $(212)_3$ — $(\ )_5$

  2 1 2

  3^3 3^1 3^0

  $18 + 3 + 2 = (23)_{10}$

5	23
5	4 3 ↑
	0 4

  $(43)_5$

- $(11)_2 + (22)_3 + (33)_4 + (44)_5 = (abc)_6$

  Find abc? GATE Question

  $3 + 8 + 15 + 24 = (50)_{10}$

6	50
6	8 2
6	1 2
	0 1

  $(122)_6$

- $(123)_5 = (x8)_y$ $\quad x < y$ && $y > 8$

$25 + 10 + 3 = xy + 8$

$30 = xy$

x	y	30
1	30	
2	15	
3	10	
~~5~~	~~6~~	Ans

- $(42)_7 = (x3)_y$

$36 + 2 = xy + 3$

$xy = 35$

x	y	35
1	35	
5	7	

- $(193)_x = (12x)_3$

$x^2 + 2x + 3 = 9 + 6 + x$

$x^2 + x - 12 = 0$

$(x + 4)(x - 3) = 0$

$x = -4, 3$

↳ Base is must be pos

* Not allowed

Ans

MY CHOICE
Date:
Page No.:

○ $(x1)_y = (44)_8$ —— $x < y$

$xy + 1 = 4 \times 8 + 4$

$xy + 1 = 36$

$xy = 35$

x	y
1	35
5	7

possible solutions

○ $(73)_x = (54)_y$

(a) 8,16 (b) 10,12 (c) 9,13 ✓(d) 8,11

$7x + 3 = 5y + 4$ $x > 7$ and $y > 5$

$7x - 5y = 1$

(d) $7 \times 8 - 5 \times 11 = 1$

○ $\sqrt{(121)_x} = (\ )_x$

$\sqrt{(x^2 + 2x + 1)_{10}} = (\ )_x$

$\sqrt{(x+1)^2_{10}} = (x+1)^{2/2}_{10}$

$(x+1)_{10} \rightarrow (11)_x$ Ans

✓The Good Paper