Lec 02 _ rgabira@uwindsor.ca  Selected questions are N°1 and N°

① (a) $(140.23)_5 \simeq (?)_2$

Step 1: Convert to base 5.

$\Rightarrow 1\times5^{2} + 4\times5^{1} + 0\times5^{0} + 2\times5^{-1} + 3\times5^{-2}$

$\Rightarrow 25 + 20 + \frac{2}{5} + \frac{3}{25} = \frac{625+500+10+3}{25} = \frac{1138}{25}$

$\frac{1138}{25} = (45.52)_{10}$

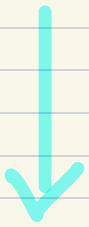
Step 2: Convert to base 2

First: The integer part: 45

| | | | | | |
|---|---|---|---|---|---|
| 45 \| 2 | | | | | |
| 44 | 22 \| 2 | | | | |
| 1 | 22 | 11 \| 2 | | | |
| | 0 | 10 | 5 \| 2 | | |
| | | 1 | 4 | 2 \| 2 | |
| | | | 1 | 2 | 1 |
| | | | | 0 | |

So, $(45)_{10} = (101101)_2$

Second: the fraction part: 0.52



0.52 x 2 = 1.04 ; we keep 1.

0.04 x 2 = 0.08 ; we keep 0.

0.08 x 2 = 0.16 ; we keep 0.

0.16 x 2 = 0.32 ; we keep 0.

0.32 x 2 = 0.64 ; we keep 0.

0.64 x 2 = 1.28 ; we keep 1.

0.28 x 2 = 0.56 ; we keep 0.

0.56 x 2 = 1.12 ; we keep 1

0.12 x 2 = 0.24 ; we keep 0

0.24 x 2 = 0.48 ; we keep 0

0.48 x 2 = 0.96 ; we keep 0

0.96 x 2 = 1.92 ; we keep 1.

0.92 x 2 = 1.84 ; we keep 1

0.84 x 2 = 1.68 ; we keep 1

0.68 x 2 = 1.36 ; we keep 1

0.36 x 2 = 0.72 ; we keep 0.

0.72 x 2 = 1.44 ; we keep 1

0.44 x 2 = 0.88 ; we keep 0

0.88 x 2 = 1.76 ; we keep 1

0.76 x 2 = 1.52 ; we keep 1

With six fraction positions compared to when using 15 fraction positions.

6 (six) $\Rightarrow (45)_{10} = (101101.100001)_2$

15 $\Rightarrow (45)_{10} = (101101.100001010001111)_2$