Lab 2 Conversions Base 2, 8, 10, 16

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* 0.25 Base 10 to Base 2, 8, 16

$0.25_{10} \longrightarrow 0.25 \times 2 = 0.5 \mid 0 \downarrow$

$0.5 \times 2 = 1.0 \mid 1 \downarrow$

$\longrightarrow \boxed{0.01_2}$

$0.25_{10} \longrightarrow 0.25 \times 8 = 2.0$

$\longrightarrow \boxed{0.2_8}$

$0.25_{10} \longrightarrow 0.25 \times 16 = 4.0$

$\longrightarrow \boxed{0.4_{16}}$ [Let check: $4 \times 16^{-1} = \frac{4}{16} = \frac{1}{4} = 0.25_{10}$]

* 0.25 Base 8 to Base 2, 10, 16

$0.25_8 \longrightarrow 0.2\ 5$ (convert each octal digit to 3 binary digit)

$00.010\ 101$

$\longrightarrow \boxed{00.010101_2}$

$0.25_8 \longrightarrow 2 \times 8^{-1} + 5 \times 8^{-2} = \frac{2}{8} + \frac{5}{64} = \frac{21}{64} = \boxed{0.328125_{10}}$

$0.25_8 \longrightarrow 0.2\ 5$

$\longrightarrow 0.010\ 101$ (first convert 3 binary digit)

$\longrightarrow 0.0101\ 0100$

$\longrightarrow \boxed{0.54_{16}}$

Let check: $5 \times 16^{-1} + 4 \times 16^{-2}$

$= \frac{5}{16} + \frac{4}{256}$

$= \frac{84}{256} = 0.328125_{10}$

* 0.25 Base 16 to Base 2, 8, 16

$0.25_{16} \longrightarrow 0.2\ \ 5$ (convert each hex digit to 4 binary digit)

$\longrightarrow 000.0010\ 0101$

$\longrightarrow \boxed{000.00100101_2}$

$0.25_{16} \longrightarrow 0.2\ \ 5$

$\longrightarrow 0.0010\ 0101$ (first convert to 4 Binary digit)

$\longrightarrow 0.\underline{001}\ \underline{001}\ \underline{010}$ (then convert 3 binary digit to octal)

$\longrightarrow \boxed{0.112_8}$

$0.25_{16} \longrightarrow 2\times16^{-1} + 5\times16^{-2} = \frac{2}{16} + \frac{5}{256} = \frac{37}{256}$

$= 0.14453125_{10}$

$0.14453125 \times 16 = 2.3125 \mid 2 \downarrow$

$0.3125 \times 16 = 5.0 \mid 5 \downarrow$

$0.14453125_{10} \longrightarrow \boxed{0.25_{16}}$

* 0.1101 Base 2 to Base 2, 10, 16

$0.1101_2 \longrightarrow 1\times2^{-1} + 1\times2^{-2} + 0\times2^{-3} + 1\times2^{-4} = \frac{1}{2} + \frac{1}{4} + \frac{1}{16}$

$= \frac{13}{16} = \boxed{0.8125_{10}}$

$0.8125 \times 2 = 1.625 \mid 1$

$0.625 \times 2 = 1.25 \mid 1$

$0.25 \times 2 = 0.5 \mid 0$

$0.5 \times 2 = 1.0 \mid 1 \downarrow$

$0.8125_{10} \longrightarrow \boxed{0.1101_2}$

$0.1101_2 \longrightarrow 0.1101$ (convert every 4 Binary digit to hex digit)

$\longrightarrow 0.\underline{1101}$

$\longrightarrow 0.13$

$\longrightarrow \boxed{0.D_{16}}$