ENG2410 Assignment #1 (Solutions)
School of Engineering, University of Guelph, Fall 2025

Prepared by: Prof. Shawki Areibi

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1. Decimal to Binary:

   (a) $(273)_{10} \rightarrow (100010001)_2$

   (b) $(441)_{10} \rightarrow (110111001)_2$

2. Binary to Decimal:

   (a) $(1111110)_2 \rightarrow 2^6 + 2^5 + 2^4 + 2^3 + 2^2 + 2^1 = (126)_{10}$

   (b) $(11001111.01)_2 \rightarrow (207.25)_{10}$

3. Decimal to Octal and Hex

   (a) $(130.5)_{10} \rightarrow (202.4)_8$ (using successive division by 8 for the whole number and successive multiplication by 8 for the fraction part).

   (b) $(611.25)_{10} \rightarrow (263.4)_{16}$ (using successive division by 16 for the whole integer number and successive multiplication by 16 for the fraction part).

4. Addition:

$$
\begin{array}{ccc}
\textit{0100} & \textit{0110} & \textit{01110110} \\
(471)_8 & (4EC)_{16} & (1101011)_2 \\
+(255)_8 & +\ (7B)_{16} & +(0111011)_2 \\
\hline
(0746)_8 & (0567)_{16} & (10100110)_2
\end{array}
$$

5. Question related to memory size and ASCII characters:

   (a) Exact number of bits:

   - $92K \rightarrow 92 \times 1024 \rightarrow (94,208)_{10}$
   - $256M \rightarrow 256 \times 2^{20} \rightarrow (268,435,456)_{10}$
   - $8G \rightarrow 8 \times 2^{30} \rightarrow (8,589,934,592)_{10}$

   (b) Complementing bit 6th will switch ASCII letters from lower case to upper case
   $A \rightarrow (01000001)_2$, $a \rightarrow (01100001)_2$