ECE-150 Digital Logic Design, Fall 2025
Quiz 1, September 18th 2025

Problem 1 (5 pts)**.**

(a) Write the Octal number, 713_8, as a sum of symbols (their equivalent decimal value) times weighting-factors (*1pts*).

(b) Convert 713_8 to binary (*1pt*) and compute its sum with $0101\ 1010\ 0111_2$ (*2pts*).

(c) Convert the result of (b) to Hexadecimal (*1pt*).

Solution.

(a)
$$713_8 = 7 \times 8^2 + 1 \times 8^1 + 3 \times 8^0$$

(b) $713_8 = 111\ 001\ 011_2 = 0001\ 1100\ 1011\ (= 1CB_{16})$.

carry: 0	0011	0001	1110_2
	0001	1100	1011_2
+	0101	1010	0111_2
0	0111	0111	0010_2

(c) We convert by groups of 4:

$$0111\ 0111\ 0010_2 = 772_{16}.$$

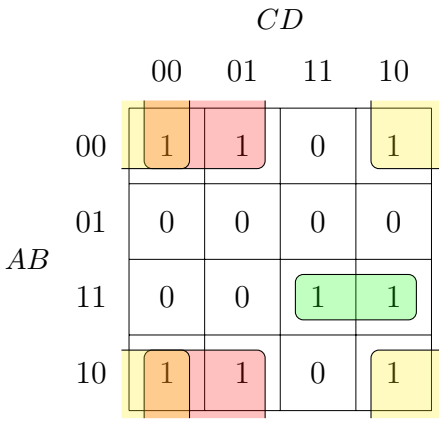
check: $0101\ 1010\ 0111_2 = 5A7_{16}$.

carry:	110_{16}
	$1CB_{16}$
+	$5A7_{16}$
	772_{16}

Problem 2 (5pts)**.** Simplify the following boolean expression using a Karnaugh-Map.

$$X = \bar{A}\bar{B}\bar{C}\bar{D} + ABC + A\bar{B}\bar{C}\bar{D} + \bar{A}\bar{B}\bar{C}D + \bar{A}\bar{B}C\bar{D} + A\bar{B}\bar{C}D + A\bar{B}C\bar{D}$$

Solution.
We fill in a K-map with the SOP min-terms and circle-1s in powers of 2:



Each circled term gives a single expression in a simplified sum of products:

$$X = \bar{B}\bar{C} + \bar{B}\bar{D} + ABC$$