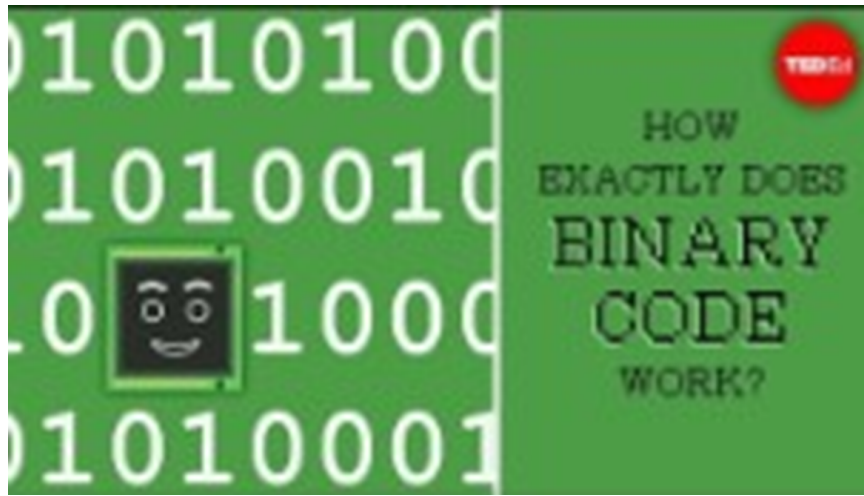


28/11/2025 - Matemáticas Discretas 1 (Vd2e)

→ Apuntes antiguos:

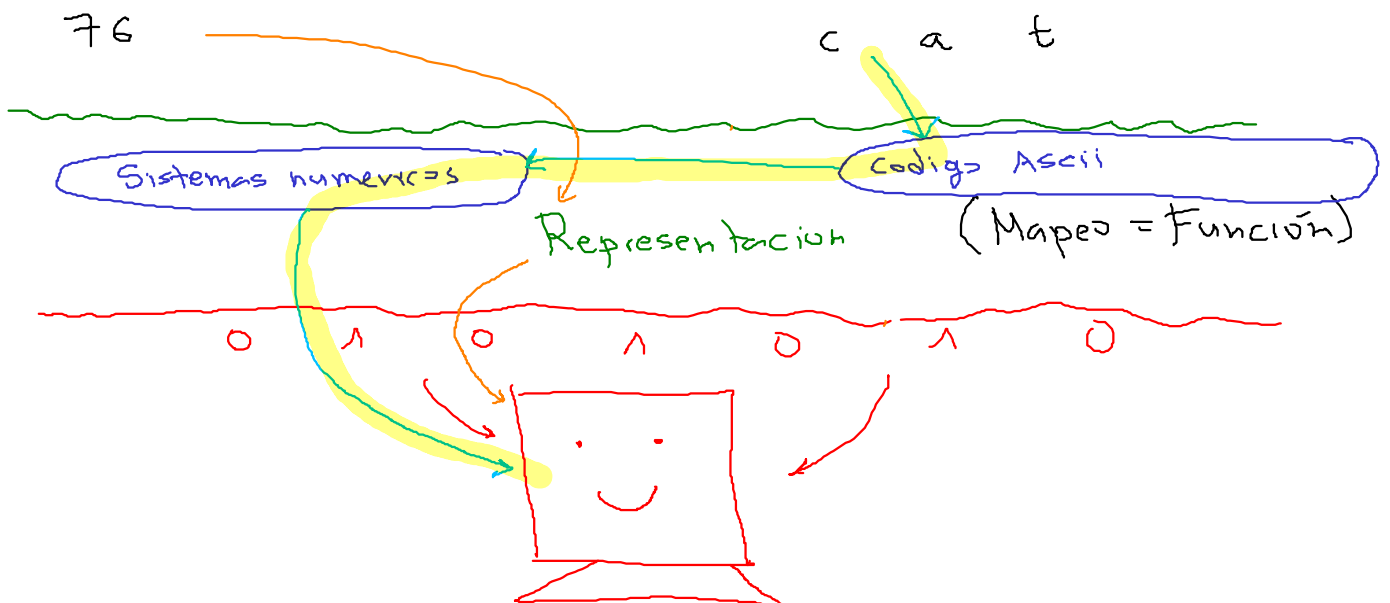
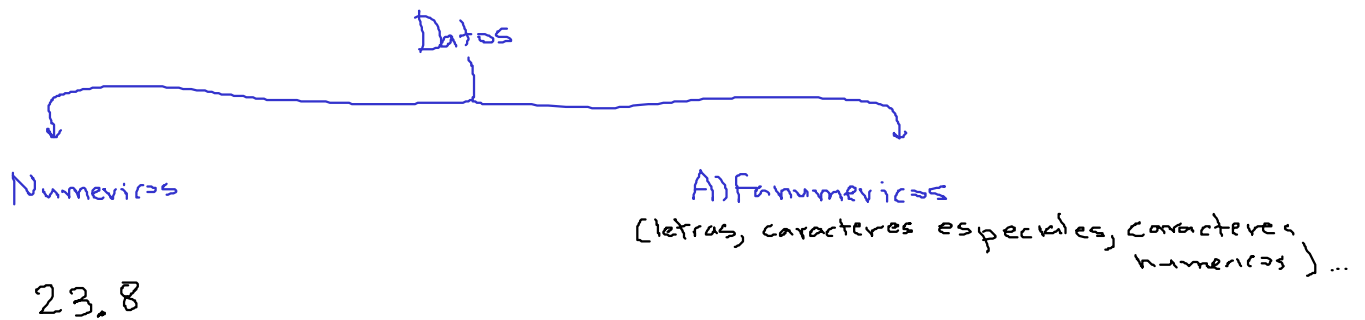
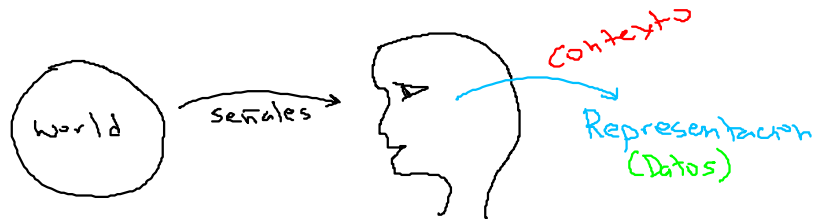
1. Introducción:

https://www.ted.com/talks/jose_americano_n_l_f_de_freitas_how_exactly_does_binary_code_work



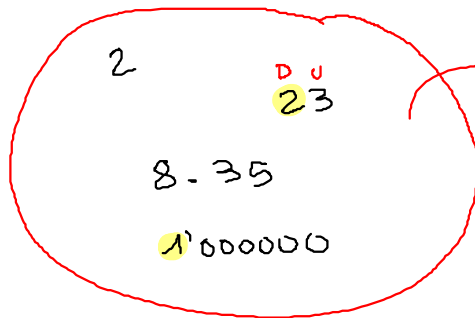
2. Información

⎵
Claude Shannon



3. Sistemas numéricos.

Sistemas numéricos posicionales



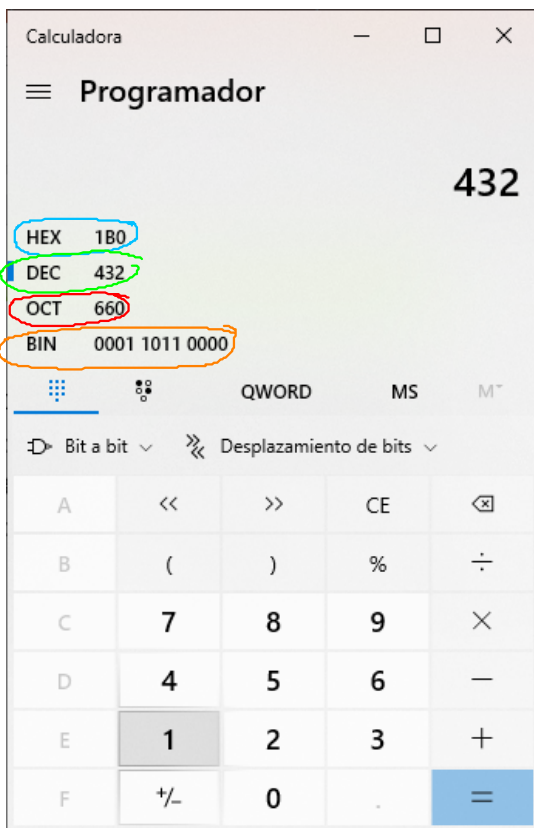
$$N = d_n \dots d_1 d_0 . d_{-1} d_{-2} \dots d_{-m}$$

Numero: N

$$\overset{D}{2} \overset{U}{3} = 2 \times 10^1 + 3 \times 10^0$$

$$d_1 d_0 = d_1 \times 10^1 + d_0 \times 10^0$$

$$N_b = \sum_{i=-m}^n d_i \times b^i$$



$$\frac{b=10}{N=432}$$

$$432_{10}$$

$$\frac{b=2}{0001\ 1011\ 0000_2}$$

$$\frac{b=8}{660_8}$$

$$\frac{b=16}{1B0_{16}}$$

$$25.4_6 = 2(6^1) + 5(6^0) + 4(6^{-1})$$

$$\downarrow$$

$$b=6 = 2(6) + 5(1) + 4(0.1\bar{7})$$

$$= 12 + 5 + 0.6\bar{8}$$

$$= 17.6\bar{8}_{10}$$

$$6^{-1} = \frac{1}{6} =$$



3. Sistemas numéricos

<u>Decimal</u>	<u>binario</u>	<u>octal</u>	y	<u>hexadecimal</u>
$b=10$	$b=2$	$b=8$		$b=16$

Decimal:

- base: $b=10$
- Dígitos: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9
- Ejemplos:

23.6₁₀

123₁₀

666

- 7

Binario:

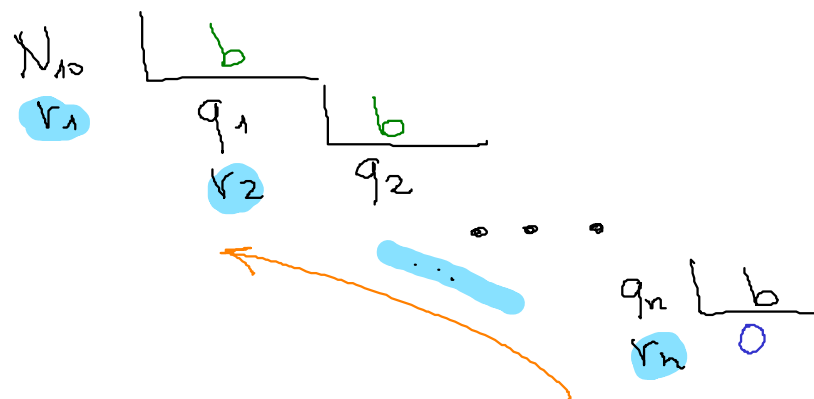
- base: $b=2$
- Dígitos: 0, 1

~~0~~ ~~1~~ ~~2~~ ~~3~~ ~~4~~ ~~5~~ ~~6~~ ~~7~~ ~~8~~ ~~9~~ ~~10~~ ~~11~~ ~~12~~ ~~13~~ ~~14~~ ~~15~~ ~~16~~ ~~17~~ ~~18~~ ~~19~~ ~~20~~ ~~21~~ ~~22~~ ~~23~~ ~~24~~ ~~25~~ ~~26~~ ~~27~~ ~~28~~ ~~29~~ ~~30~~ ~~31~~ ~~32~~ ~~33~~ ~~34~~ ~~35~~ ~~36~~ ~~37~~ ~~38~~ ~~39~~ ~~40~~ ~~41~~ ~~42~~ ~~43~~ ~~44~~ ~~45~~ ~~46~~ ~~47~~ ~~48~~ ~~49~~ ~~50~~ ~~51~~ ~~52~~ ~~53~~ ~~54~~ ~~55~~ ~~56~~ ~~57~~ ~~58~~ ~~59~~ ~~60~~ ~~61~~ ~~62~~ ~~63~~ ~~64~~ ~~65~~ ~~66~~ ~~67~~ ~~68~~ ~~69~~ ~~70~~ ~~71~~ ~~72~~ ~~73~~ ~~74~~ ~~75~~ ~~76~~ ~~77~~ ~~78~~ ~~79~~ ~~80~~ ~~81~~ ~~82~~ ~~83~~ ~~84~~ ~~85~~ ~~86~~ ~~87~~ ~~88~~ ~~89~~ ~~90~~ ~~91~~ ~~92~~ ~~93~~ ~~94~~ ~~95~~ ~~96~~ ~~97~~ ~~98~~ ~~99~~ ~~100~~ ~~101~~ ~~102~~ ~~103~~ ~~104~~ ~~105~~ ~~106~~ ~~107~~ ~~108~~ ~~109~~ ~~110~~ ~~111~~ ~~112~~ ~~113~~ ~~114~~ ~~115~~ ~~116~~ ~~117~~ ~~118~~ ~~119~~ ~~120~~ ~~121~~ ~~122~~ ~~123~~ ~~124~~ ~~125~~ ~~126~~ ~~127~~ ~~128~~ ~~129~~ ~~130~~ ~~131~~ ~~132~~ ~~133~~ ~~134~~ ~~135~~ ~~136~~ ~~137~~ 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~~1122~~ ~~1123~~ ~~1124~~ ~~1125~~ ~~1126~~ ~~1127~~ ~~1128~~ ~~1129~~ ~~1130~~ ~~1131~~ ~~1132~~ ~~1133~~ ~~1134~~ ~~1135~~ ~~1136~~ ~~1137~~ ~~1138~~ ~~1139~~ ~~1140~~ ~~1141~~ ~~1142~~ ~~1143~~ ~~1144~~ ~~1145~~ ~~1146~~ ~~1147~~ ~~1148~~ ~~1149~~ ~~1150~~ ~~1151~~ ~~1152~~ ~~1153~~ ~~1154~~ ~~1155~~ ~~1156~~ ~~1157~~ ~~1158~~ ~~1159~~ ~~1160~~ ~~1161~~ ~~1162~~ ~~1163~~ ~~1164~~ ~~1165~~ ~~1166~~ ~~1167~~ ~~1168~~ ~~1169~~ ~~1170~~ ~~1171~~ ~~1172~~ ~~1173~~ ~~1174~~ ~~1175~~ ~~1176~~ ~~1177~~ ~~1178~~ ~~1179~~ ~~1180~~ ~~1181~~ ~~1182~~ ~~1183~~ ~~1184~~ ~~1185~~ ~~1186~~ ~~1187~~ ~~1188~~ ~~1189~~ ~~1190~~ ~~1191~~ ~~1192~~ ~~1193~~ ~~1194~~ ~~1195~~ ~~1196~~ ~~1197~~ ~~1198~~ ~~1199~~ ~~1200~~ ~~1201~~ ~~1202~~ ~~1203~~ ~~1204~~ ~~1205~~ ~~1206~~ ~~1207~~ ~~1208~~ ~~1209~~ ~~1210~~ ~~1211~~ ~~1212~~ ~~1213~~ ~~1214~~ ~~1215~~ ~~1216~~ ~~1217~~ ~~1218~~ ~~1219~~ ~~1220~~ ~~1221~~ ~~1222~~ ~~1223~~ ~~1224~~ ~~1225~~ ~~1226~~ ~~1227~~ ~~1228~~ ~~1229~~ ~~1230~~ ~~1231~~ ~~1232~~ 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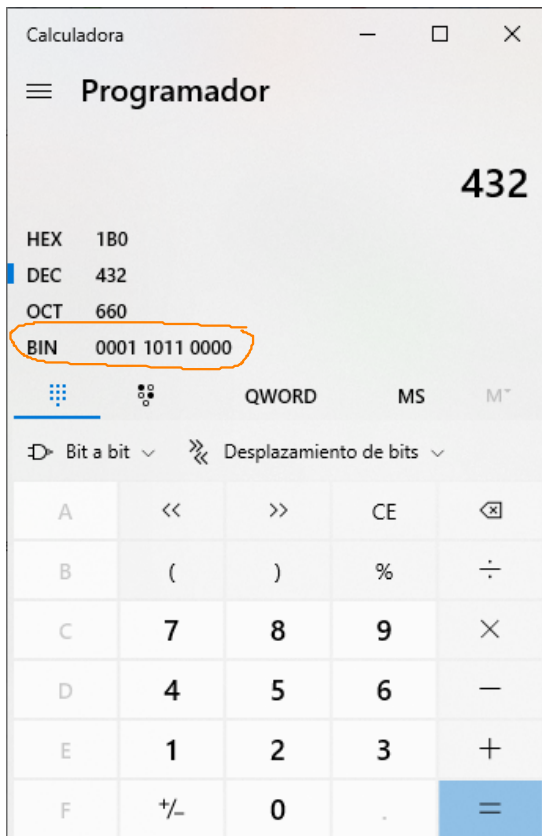
$$\begin{aligned}
 1A D_{16} &= 1(16^2) + A(16^1) + D(16^0) \\
 &= 1(16^2) + 10(16^1) + 13(16^0) \\
 &= 1(256) + 10(16) + 13(1) \\
 &= 429_{10}
 \end{aligned}$$



4. Divisiones sucesivas



$$N_b = r_n r_{n-1} \dots r_1$$



$$N = 432_{10}$$

$$1. N_2 = ?$$

$$\checkmark N_2 = 110110000$$

$$2. N_8 = ?$$

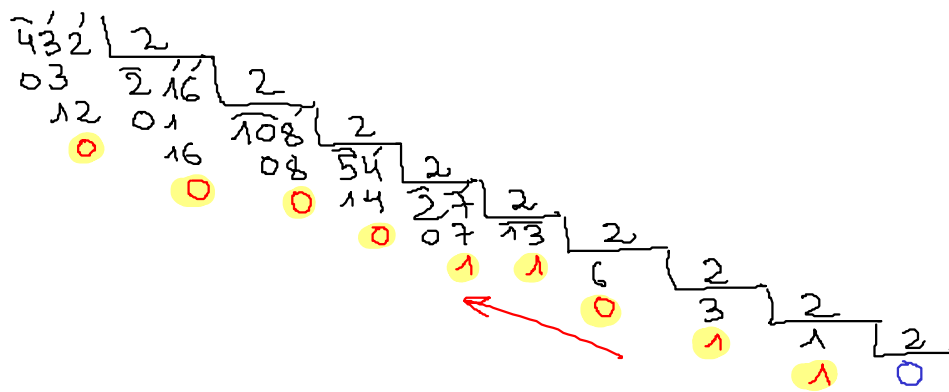
$$N_8 = 660_8$$

$$2. N_{16} = ?$$

$$N_{16} = 1B\phi_{16}$$

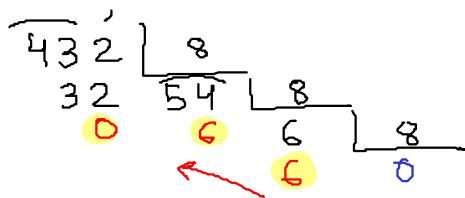
$$N_{10} = 432 = 432_{10} \longrightarrow N_2 = ?$$

$$b = 2$$



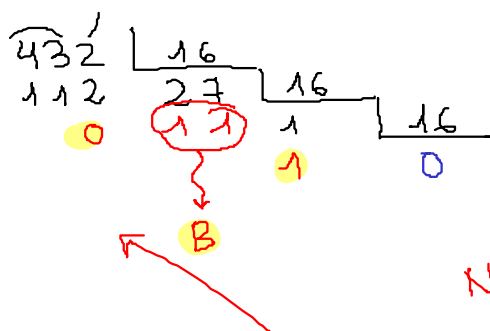
$$N_2 = 110110000_2$$

$$N_{10} = 432 = 432_{10} \longrightarrow N_8 = ?$$

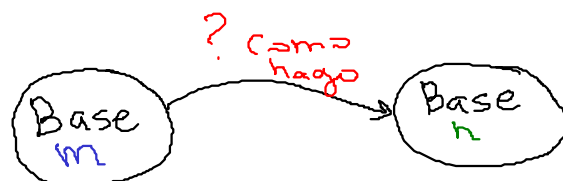


$$N_8 = 660_8$$

$$N_{10} = 432 = 432_{10} \longrightarrow N_{16} = ?$$



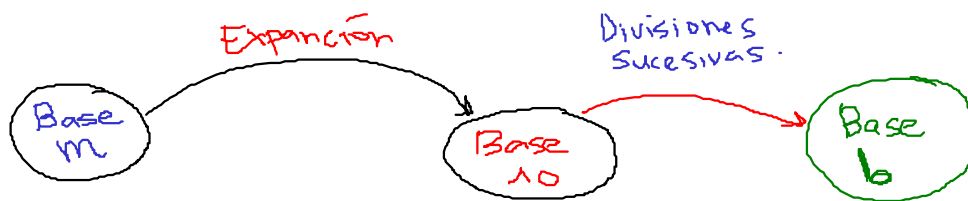
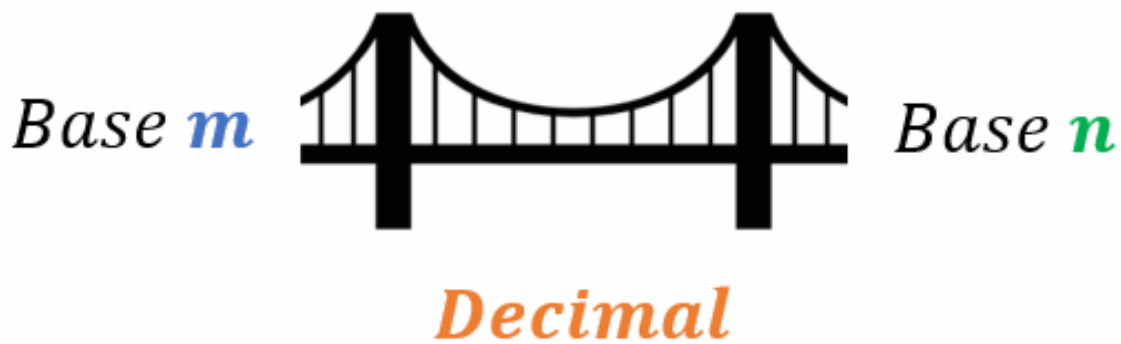
$$N_{16} = 1B0_{16}$$



$$m \neq 10$$

$$n \neq 10$$

5. Método del Puente



Ejemplo: $42_5 \rightarrow N_9 = ?$

P1. $42_5 \rightarrow N_{10} = ?$

$$\begin{aligned}
 42_5 &= 4(5^1) + 2(5^0) \\
 &= 4(5) + 2(1) \\
 &= 20 + 2 \\
 &= 22
 \end{aligned}$$

$$42_5 = 22_{10}$$

P2. $22_{10} \rightarrow N_9 = ?$

$$\begin{array}{r}
 22 \overline{) 9} \\
 \underline{4} \\
 2 \overline{) 9} \\
 \underline{2} \\
 0
 \end{array}$$

$22_{10} = 24_9$

$$42_5 = 24_9$$

6. Método Directo (Binario , octal , Hexadecimal)

$$b=2$$

$$b=8=2^3$$

$$b=16=2^4$$

$$\begin{array}{r}
 7 \overline{) 2} \\
 \underline{1} \\
 3 \overline{) 2} \\
 \underline{1} \\
 1 \overline{) 2} \\
 \underline{1} \\
 0
 \end{array}$$

$7 = 111_2$

$$\begin{array}{r}
 12 \overline{) 2} \\
 \underline{0} \\
 6 \overline{) 2} \\
 \underline{0} \\
 3 \overline{) 2} \\
 \underline{1} \\
 1 \overline{) 2} \\
 \underline{1} \\
 0
 \end{array}$$

$12 = 1100_2$

Octa)	Binario
0	000
1	001
2	010
3	011
4	100
5	101
6	110
7	111

Hexadecimal	Binario
0	0000
1	0001
2	0010
3	0011
4	0100
5	0101
6	0110
7	0111
8	1000
9	1001
A(10)	1010
B(11)	1011
C(12)	1100
D(13)	1101
E(14)	1110
F(15)	1111

Ejemplo:

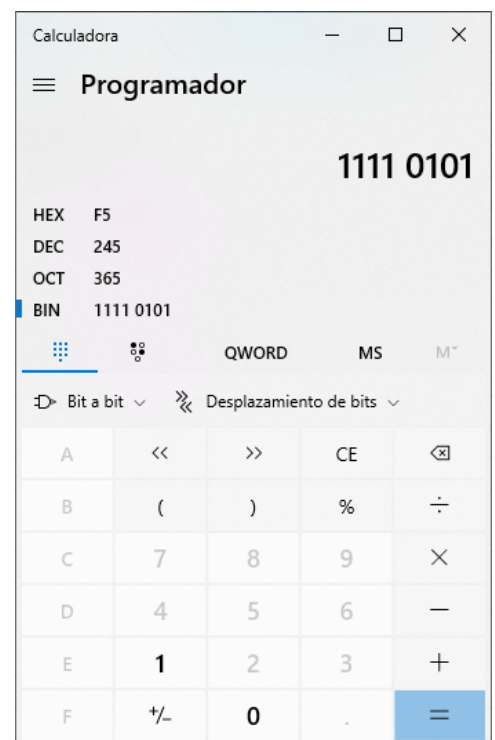
$$175_8 \rightarrow N_2 = ?$$

$$175_8 = \underbrace{1}_{001} \underbrace{7}_{111} \underbrace{5}_{101} = \underbrace{001}_1 \underbrace{111}_7 \underbrace{101}_5_2$$

$$00011110101_2 = N_{16} = ?$$

$$b=8 \quad \underbrace{0000}_{0} \underbrace{1111}_{3} \underbrace{1010}_{6} \underbrace{1}_{5} = 365_8$$

$$b=16 \quad \underbrace{0000}_{0} \underbrace{1111}_{F} \underbrace{1010}_{5} = F5_{16}$$



$$1A_{16} \rightarrow N_8 = ?$$

$$P1. \quad 1A_{16} \rightarrow N_2$$

$$1A_{16} = \underbrace{1}_{0001} \underbrace{A}_{1010} = \cancel{000}11010 = 11010_2$$

$$P2. \quad N_2 \longrightarrow N_8$$

$$b=8 \quad \underbrace{0110}_3 \underbrace{10}_2 = 32_8$$

$$1A_{16} = 32_8$$

Apuntes nuevos (agregados el 28/11/2025)