1 Question

Q1

Exercise

Convert the following number from Binary to Gray:

$$1110110$$

Convert the following number from Gray to Binary:

$$1001101$$

1.1 Correction

Q1

Solutions

Binary → Gray Conversion

Binary	1	1	1	0	1	1	0
Arrows	↓	↘ ⊕ ↓	↘ ⊕ ↓	↘ ⊕ ↓	↘ ⊕ ↓	↘ ⊕ ↓	↘ ⊕ ↓
Gray	**1**	**0**	**0**	**1**	**1**	**0**	**1**
Steps	Copy first bit	XOR $1 \oplus 1 = 0$	XOR $1 \oplus 1 = 0$	XOR $1 \oplus 0 = 1$	XOR $0 \oplus 1 = 1$	XOR $1 \oplus 1 = 0$	XOR $1 \oplus 0 = 1$

Gray → Binary Conversion

Gray	1	0	0	1	1	0	1
Arrows	↓	↗ ⊕ ↓	↗ ⊕ ↓	↗ ⊕ ↓	↗ ⊕ ↓	↗ ⊕ ↓	↗ ⊕ ↓
Binary	**1**	**1**	**1**	**0**	**1**	**1**	**0**
Steps	Copy first bit	XOR $1 \oplus 0 = 1$	XOR $1 \oplus 0 = 1$	XOR $1 \oplus 1 = 0$	XOR $0 \oplus 1 = 1$	XOR $1 \oplus 0 = 1$	XOR $1 \oplus 1 = 0$

Illustration of Bit Change (Next Gray Code)

Binary Increment Illustration

x: 1001101 → $x+1$: 1001100

Position	0	1	2	3	4	5	6
x	1	0	0	1	1	0	1
$x+1$	1	0	0	1	1	0	**0**

Highlighted cell(s) = changed bit(s)

Gray Code Sequence

Gray Code Sequence (Bit Changes)

Step	Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6
x + 0	1	0	0	1	1	0	1
x + 1	1	0	0	1	1	0	**0**
x + 2	1	0	0	**0**	1	0	0

Highlighted cell shows the bit that flipped compared to the previous Gray code.