April 10, 2026

Exam Reviews - Part 1

Q.1 Octal 623.14 → Binary 9:41 am

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

↓

110 010 011 . 001 100

Q.2 Decimal 198.625 → Binary, Octal, Hex

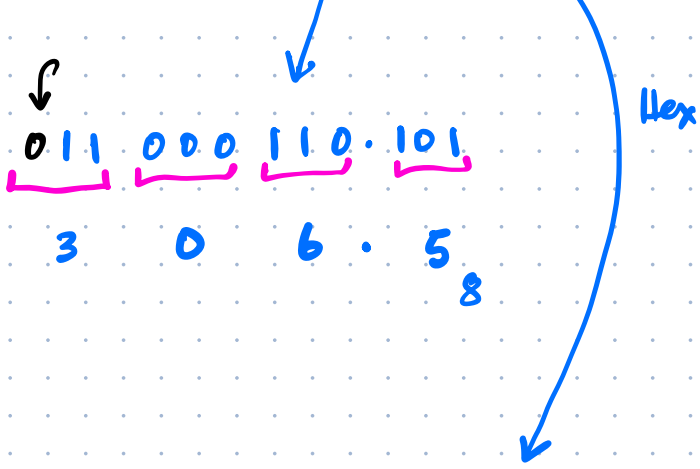
Division	Quotient	Remainder
198 ÷ 2	99	0
99 ÷ 2	49	1
49 ÷ 2	24	1
24 ÷ 2	12	0
12 ÷ 2	6	0
6 ÷ 2	3	0
3 ÷ 2	1	1
1 ÷ 2	0	1

11000110

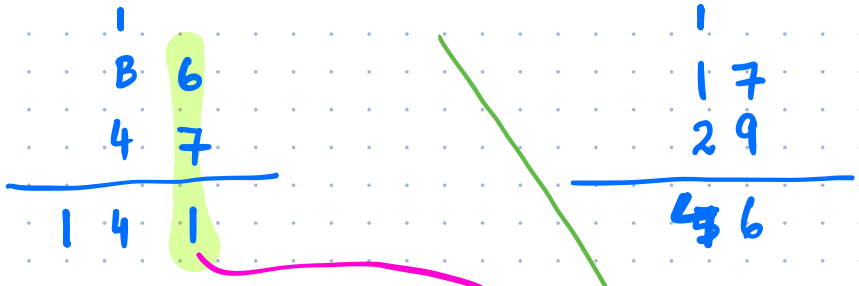
Step	Result	Bit
0.625 × 2	1.25	1
0.25 × 2	0.50	0
0.50 × 2	1.0	1

Answer: 11000110.101_2

Octal



Q.3 Duodecimal addition. Compute B6 + 47 (Base-12)



Duodecimal Base-12.

0	6
1	7
2	8
3	9
4	A
5	B

$6 + 7 = 13 = 1 \times 12^1 + 1 \times 12^0$

$7 + 9 = 16 = 1 \times 10^1 + 6 \times 10^0$

$1 + B + 4 = 16 = 1 \times 12^1 + 4 \times 12^0$

$1 + 1 + 2 = 4 = 4 \times 10^0$

$B6_{12} + 47_{12} = 141_{12}$

Q.4 Encode data 1101 using Hamming (7,4)

Pos	1	2	3	4	5	6	7
	1	0	1	0	1	0	1
	P_1	P_2	d_1	P_3	d_2	d_3	d_4

P_1 (1, 3, 5, 7) $\quad 1+1+1+1$

P_2 (2, 3, 6, 7) $\quad 0+1+0+1$

P3 (4, 5, 6, 7) $\quad$ 0+1+0+1 = 2

Q.5 You've received 1010110 → 0010110

1 2 3 4 5 6 7

P1 ✗

P2 ✓ → location

P3 ✓

P3	P2	P1
0	0	1

data 1110

Q.6 How to compute 2's compliment and 1's compliment.

Q.7 Booth's algorithm for multiplying 2 and -7

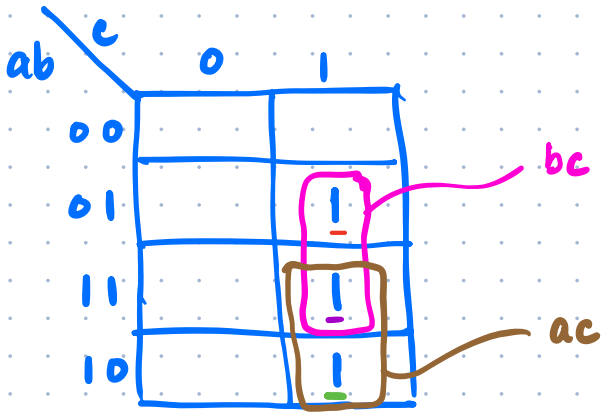
Q.8 Binary addition in 2's compliment

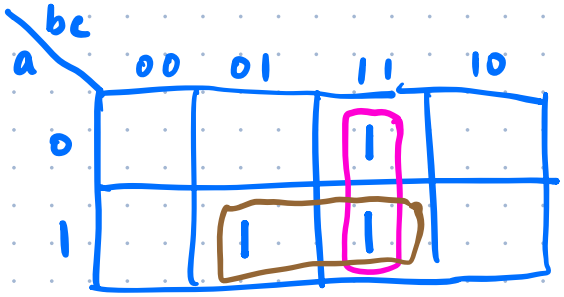
Q.9 Construct a circuit where output is 1 for all 3-bit odd inputs greater than 1.

	a	b	c	f
0	0	0	0	0
1	0	0	1	0
2	0	1	0	0
3	0	1	1	1
4	1	0	0	0
5	1	0	1	1
6	1	1	0	0
7	1	1	1	1

$f = \bar{a}bc + a\bar{b}c + abc$

$f = a'bc + ab'c + abc$





$f = ac + bc$

implement using NAND gates only.

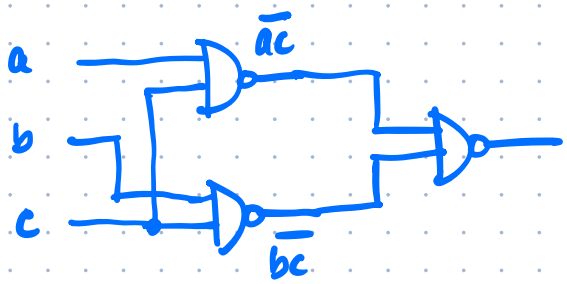
$\overline{a+b} = \bar{a}.\bar{b}$

$\overline{a.b} = \bar{a} + \bar{b}$

$f = ac + bc$

$= \overline{\overline{ac}} + \overline{\overline{bc}}$

$= \overline{\overline{ac}.\overline{bc}}$



$\overline{\overline{ac}.\overline{bc}} = ac + bc$