

1. a)  $(101101011101)_2$

$$\begin{array}{r} 010010100010 \\ + 1 \end{array}$$

$$\hline \overline{010010100011}$$

=  $(1187)_10$  no baud ci twqni ett

$$7 | 1187$$

$$7 | 169 - 4$$

$$7 | 24 - 1$$

$$7 | 3 - 3$$

$$0 - 3$$

$80 - (111110)$  ← (Ans.) etop siow

80N. AND ← " loenavim

80N. OR ← " eviudar

b)  $(00110010101)_2$

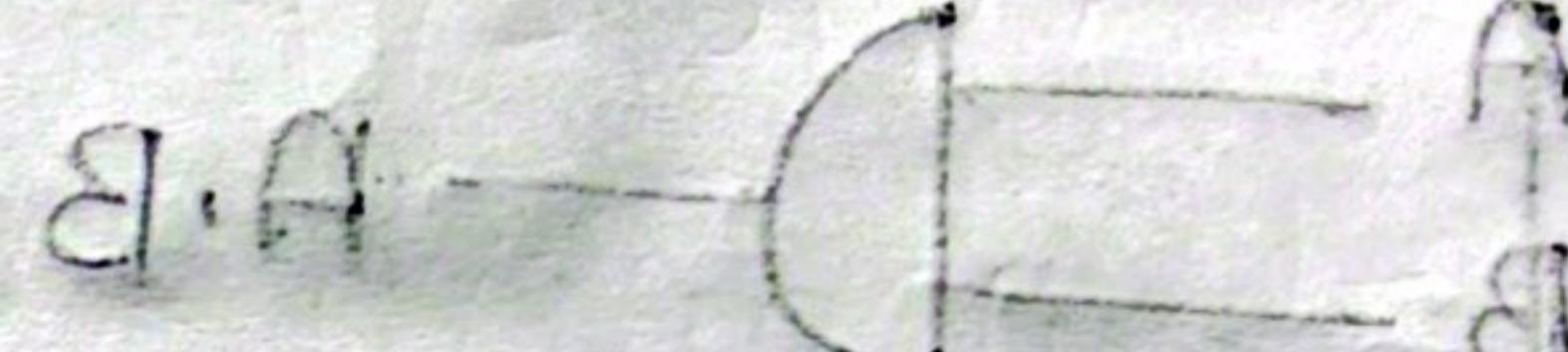
=  $+ (405)_10$  etop DR ← + AND gate

$$9 | 405 \quad B+A = + (500) 0B \quad A$$

$$0 | 45 - 0 \quad \text{Hilf twqni}$$

$$0 | 5 - 0 \quad \text{label to next}$$

$$0 - 5 \quad . t \text{ ei twqni}$$



Led Hilf twqni

Hilf next pno

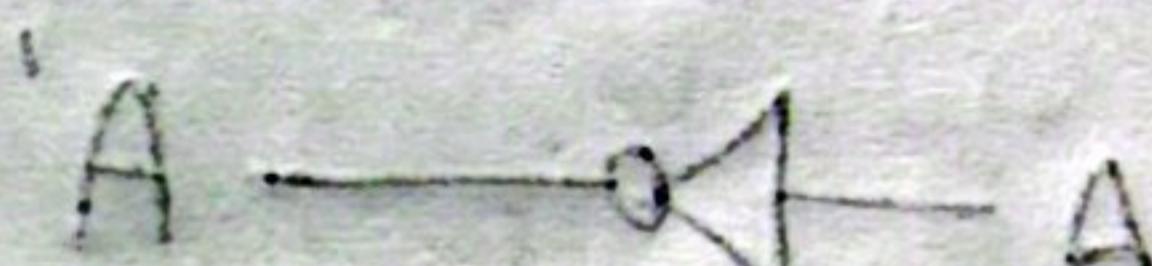
8421. L etop etwqni

c)  $(0011)_{BCD}$

=  $(3)_10$

$$5 | 3 \quad = (3)_5 \quad (\text{Ans.})$$

etop TON



sci Hilf twqni

sci eviudar

twqni ett

d)  $(01001010101111)_2$

=  $+ (9567)_10$  (Ans.)

no baud etop etop loenavim A \*

e)  $(101010101000011)_2$

=  $010101010111100$  etop etop pno frennalgmi

=  $+ 1$  etop etop eviudar MA \*

=  $- (10941)_10$  eviudar no baud

$$f) (010010101011111)_B$$

$$= +(9567)_{10}$$

$$g) (101010101000011)_B$$

$$= 01010101011100 \text{ (overflow)} -$$

$$= -(10940)_{10} \text{ (FF1) overflow (FF1)}$$

$$2. (-6) - (+5) = -6 + (-5)$$

$$6 = 000110$$

$$6 = 11001 + 1$$

$$-6 \quad \overline{-111010} \quad \text{overflow}$$

$$5 = 001010 \text{ (overflow)}$$

$$= 11010 + 1$$

Now

$$-5 = 11011$$

$$10101 \text{ (overflow)}$$

$$= 01010 + 1$$

$$01011$$

$$\text{Carry } \leftarrow \begin{array}{r} 11010 \\ + 11011 \\ \hline 10101 \end{array}$$

$$= -(11)_{10}$$

Because added two negative numbers, answer is also negative.

No overflow.

$$3. 1's \rightarrow -[2^{13-1} - 1] \text{ to } [2^{13-1} - 1]$$

$$= -(4095)_{10} \quad (4095)_{10}$$

$$= -(FFFF)_{16} \quad (FFFF)_{16}$$

Largest number = +(FFFF)16

4. Sign & magnitude →

$$\begin{aligned}
 &= [2^{8-1} - 1] \text{ to } [2^{8-1} - 1] \\
 &= -(127)_{10} \text{ to } (127)_{10} \\
 &= -(177)_8 \text{ to } (177)_8 \\
 &\text{smallest number } -(177)_8
 \end{aligned}$$

5.

$$\begin{aligned}
 (43434134)_5 &= 4 \times 5^7 + 3 \times 5^6 + 4 \times 5^5 + 3 \times 5^4 + 4 \times 5^3 \\
 &\quad + 1 \times 5^2 + 3 \times 5^1 + 4 \times 5^0 \\
 &= (374294)_{10} \\
 &= (1333026)_8 \\
 (164)_7 &= 1 \times 7^2 + 6 \times 7^1 + 4 \times 7^0 \\
 &= (95)_{10} \\
 &= (137)_8
 \end{aligned}$$

$137 \times 0 = 0$   
 $137 \times 1 = 137$   
 $137 \times 2 = 274$   
 $137 \times 3 = 411$   
 $137 \times 4 = 548$   
 $137 \times 5 = 685$   
 $137 \times 6 = 822$   
 $137 \times 7 = 959$

$$\begin{array}{r}
 1333026 \\
 \times 137 \\
 \hline
 1231 \\
 1020 \\
 \hline
 733 \\
 \hline
 652 \\
 574 \\
 \hline
 566 \\
 435 \\
 \hline
 131
 \end{array}$$

Quotient - 7543

Remainder - 131