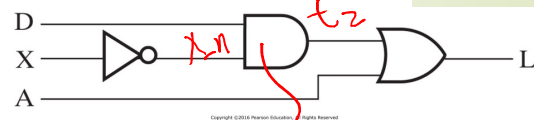# EGC220
Class Notes
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```
module fig2_5 (L, D, X, A);
    input D, X, A;
    output L;
    wire X_n, t2;

    not (X_n, X);
    and (t2, D, X_n);
    or (L, t2, A);
endmodule
```

1. Perform the following operations in binary. Assume signed 2's complement notation.
   a. 54 + 72

   b. 54 – 72

   c. 72 – 54

$$
\begin{array}{rl}
+54 & \quad 0\ 0\ 1\ 1\ 0\ 1\ 1\ 0 \\
\pm72 & \quad -0\ 1\ 0\ 0\ 1\ 0\ 0\ 0 \\
\hline
+126 & \quad 0\ 1\ 1\ 1\ 1\ 1\ 1\ 0
\end{array}
$$

Column headers: S 64 32 16 8 4 2 1

$$
\begin{array}{rl}
54 & \quad 0\ 0\ 1\ 1\ 0\ 1\ 1\ 0 \\
-72 & \quad 1\ 0\ 1\ 1\ 1\ 0\ 0\ 0 \\
\hline
-18 & \quad 1\ 1\ 1\ 0\ 1\ 1\ 1\ 0 \\
+72 & \quad 0\ 1\ 0\ 0\ 1\ 0\ 0\ 0 \\
-54 & \quad 1\ 1\ 0\ 0\ 1\ 0\ 1\ 0 \\
\hline
+18 & \quad 0\ 0\ 0\ 1\ 0\ 0\ 1\ 0
\end{array}
$$

c=1

1. Perform the following operations in binary. Assume signed 2's complement notation.
   (-72) – (-54)

Column headers: S 64 32 16 8 4 2 1

$$
\begin{array}{rl}
+72 & \quad 0\ 1\ 0\ 0\ 1\ 0\ 0\ 0 \\
-72 & \quad 1\ 0\ 1\ 1\ 1\ 0\ 0\ 0 \\
54 & \quad 0\ 0\ 1\ 1\ 0\ 1\ 1\ 0 \\
-54 & \quad 1\ 1\ 0\ 0\ 1\ 0\ 1\ 0 \\
-(-54) & \quad 0\ 0\ 1\ 1\ 0\ 1\ 1\ 0
\end{array}
$$

$$
\begin{array}{rl}
-72 & \quad 1\ 0\ 1\ 1\ 1\ 0\ 0\ 0 \\
-(-54) & \quad 0\ 0\ 1\ 1\ 0\ 1\ 1\ 0 \\
\hline
 & \quad 1\ 1\ 1\ 0\ 1\ 1\ 1\ 0
\end{array}
$$

→ -0001 0010
   -18

1. Decide the following ASCII code
1000010 1101001 1101100 1101100 1000111 1100001 1110100 1100101 1110011

[handwritten: B i l l G a t e s]

□ **TABLE 1-5**
American Standard Code for Information Interchange (ASCII)

					$B_7B_6B_5$			
$B_4B_3B_2B_1$	000	001	010	011	100	101	110	111
0000	NULL	DLE	SP	0	@	P	`	p
0001	SOH	DC1	!	1	A	Q	a	q
0010	STX	DC2	"	2	B	R	b	r
0011	ETX	DC3	#	3	C	S	c	s
0100	EOT	DC4	$	4	D	T	d	t
0101	ENQ	NAK	%	5	E	U	e	u
0110	ACK	SYN	&	6	F	V	f	v
0111	BEL	ETB	'	7	G	W	g	w
1000	BS	CAN	(	8	H	X	h	x
1001	HT	EM	)	9	I	Y	i	y
1010	LF	SUB	*	:	J	Z	j	z
1011	VT	ESC	+	;	K	[	k	{
1100	FF	FS	,	<	L	\	l	|
1101	CR	GS	-	=	M	]	m	}
1110	SO	RS	.	>	N	^	n	~
1111	SI	US	/	?	O	_	o	DEL

---

1. Convert 134_{10} to BCD code

[handwritten: 0001 0011 0100₂ ≠ 134₁₀]

1. By means of truth table and waveform determine the outputs of the circuit

[handwritten table: A B C D | X ; 0 0 0 0 | 0 ...]

a.

A
B   → x
C

[handwritten: $\overline{ABC}$]

b.

A
B   → x
C
D

[handwritten: = A+B+C+D]
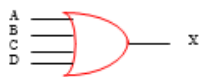
[handwritten table: ABC | $\overline{ABC}$; 000 | 1 ; 001 | 1 ; 010 | 1 ; 011 | 1 ; 100 | 1 ; 101 | 1 ; 110 | 1 ; 111 | 0]

1. Write the Boolean expression of the following circuit:

$\overline{AB}$ $\overline{\overline{AB}}$ AB $Z = ABCD$

CD
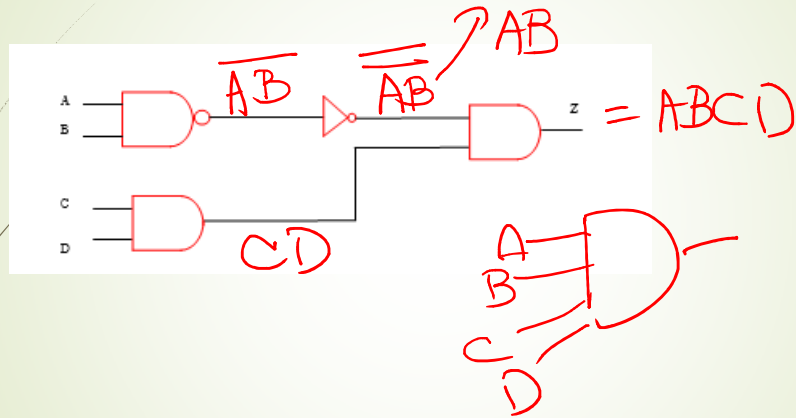
1. Draw the logic circuit realization of the following Boolean expression as stated. Do not simplify!

$$Y = f(A, B, C) = \overline{(A + B)}(\overline{B} + C)$$

$\overline{A+B}$

Y

$\overline{B}$

$(\overline{A+B})(\overline{B}+c)$

$\overline{B}+C$

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