Sign - magnitude → (S)(Magnitude)

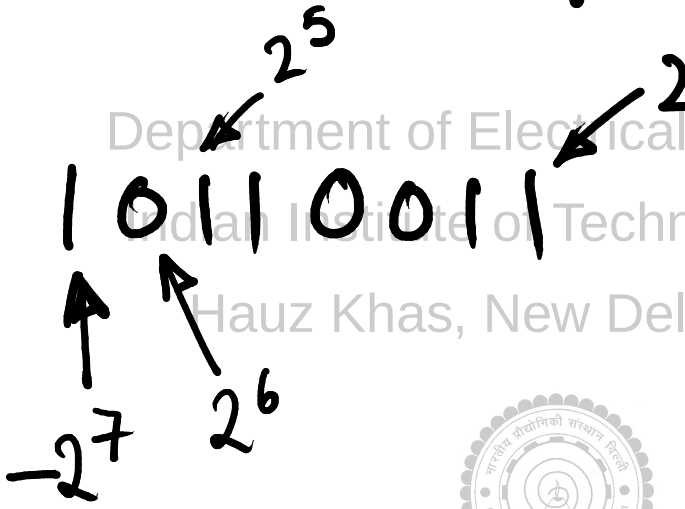
1's complement → if N > 0 N

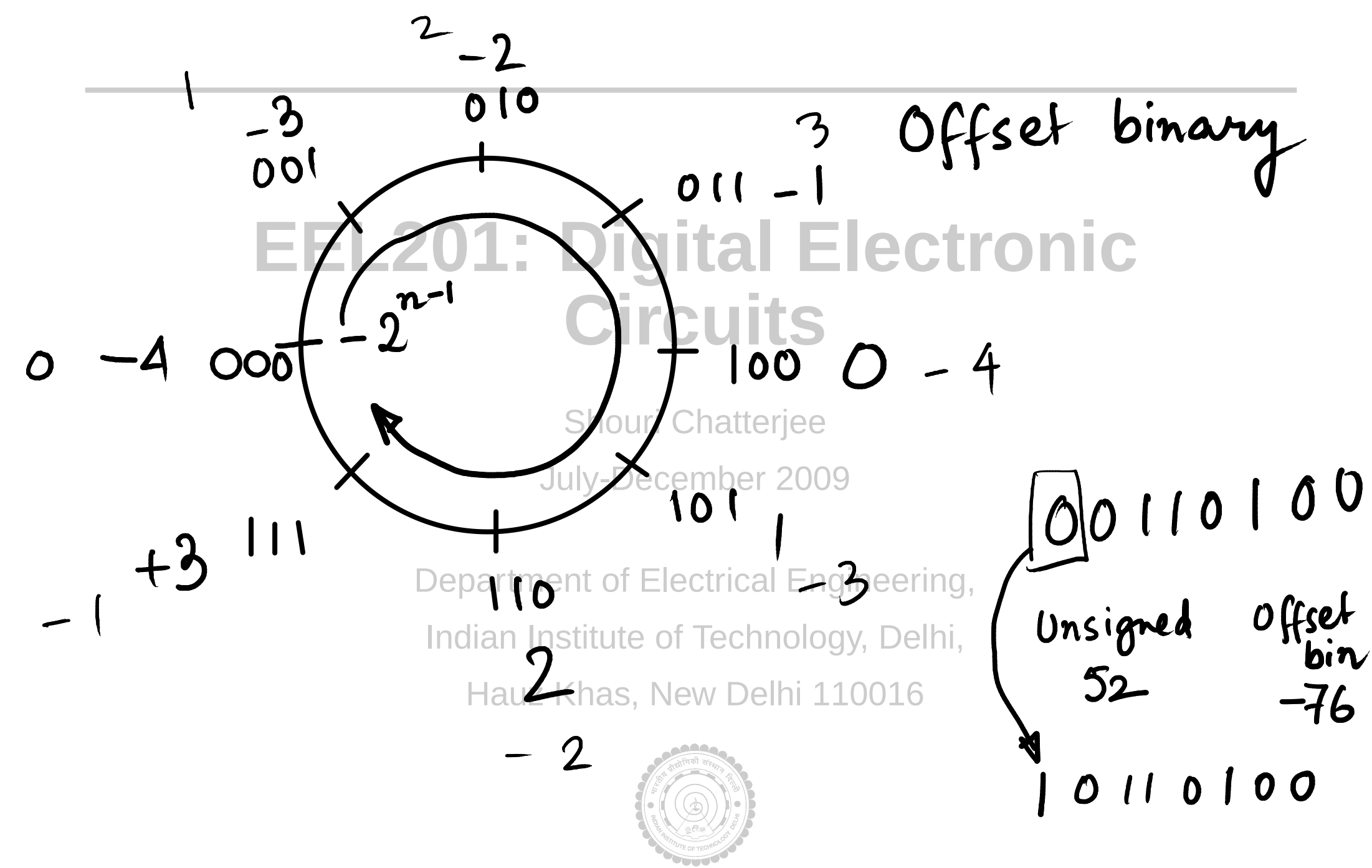
if N < 0 11111111 + (N)

2's complement

if N > 0 N

if N < 0 100000000 + (N)





01 01

01101001 → 105

− 00111111 → 63

00101010 → 42

32 + 8 + 2

0110
× 1001

0110
0000
0000
0110

01101110

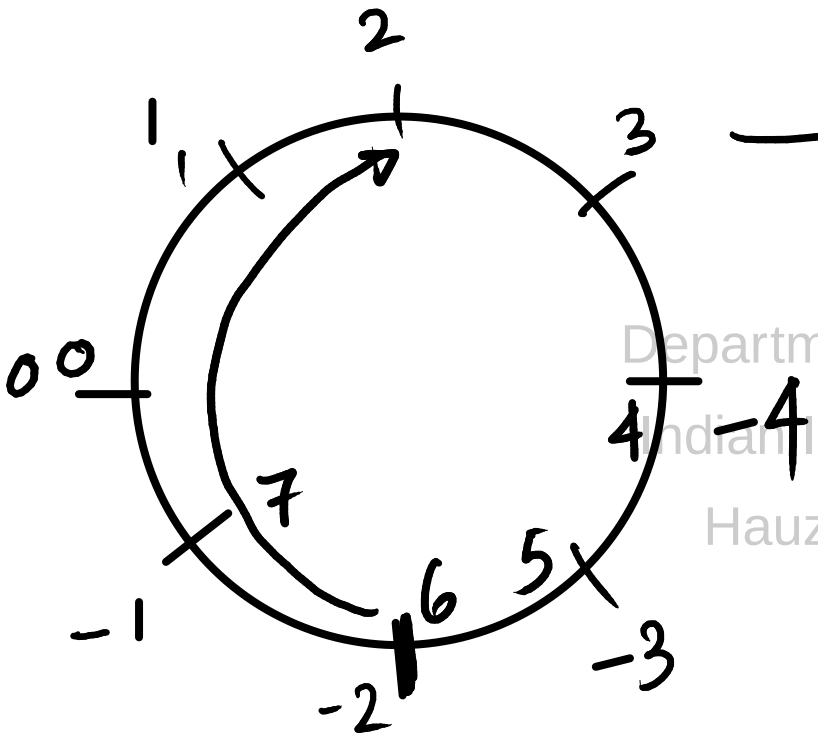
−8 ↔ +7

−8 ↔ +7

−56 ↔ +64

Signed addition/subtraction

2's complement



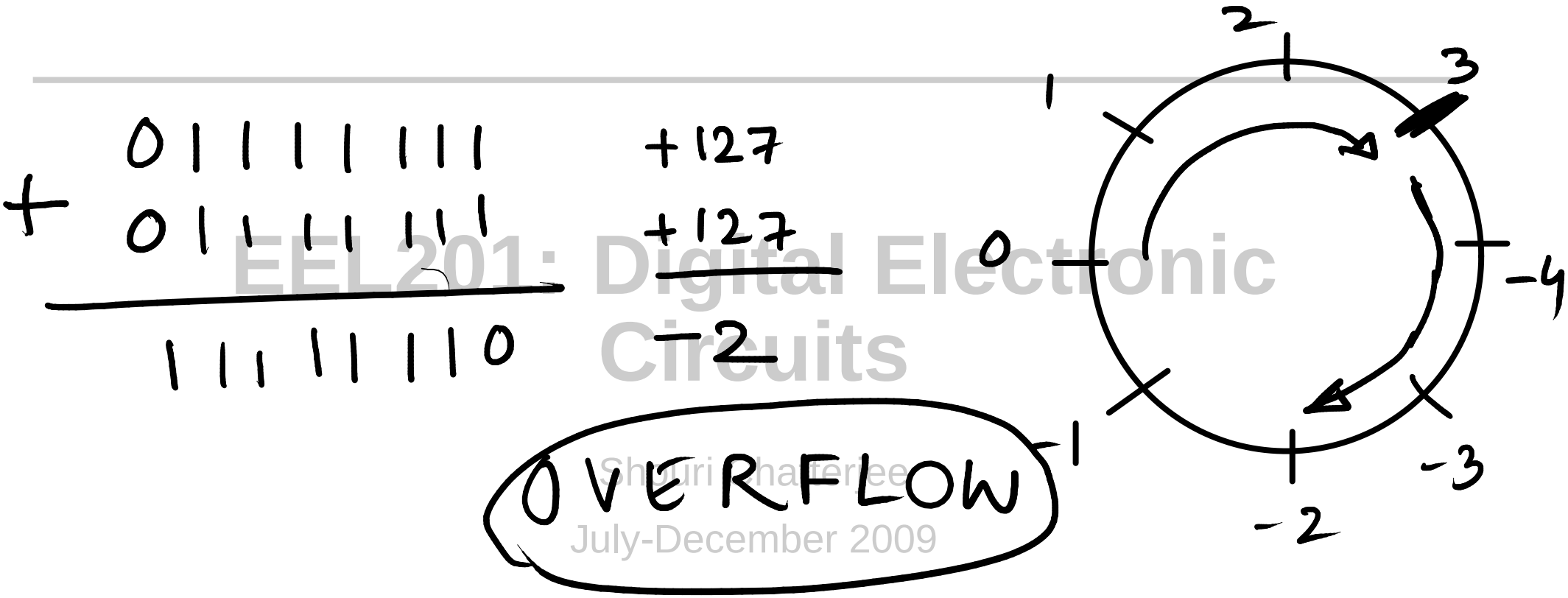
$$\begin{array}{rll} & -128 & \\ & 1\ \ 1\ \ 1\ \ 1 & \\ & 1001\,1001 & = -103 \\ + & 0011\,0011 & = +51 \\ \hline & 1\,1001\,100 & -52 \\ & -128\ +64\ \ +8\ +4 & \end{array}$$

2's complement subtraction

$$
\begin{array}{r}
00010110 \quad 22 \\
- \quad 01001001 \quad 73 \\
\hline
-51
\end{array}
$$

$$
\begin{array}{r}
00010110 \\
+ \quad 10110110 \\
\hline
11001101
\end{array}
$$

$$
\begin{array}{cccccccc}
-128 & 64 & 32 & 16 & 8 & 4 & 2 & 1 \\
1 & 1 & 0 & 0 & 1 & 1 & 0 & 1
\end{array}
$$



EEL201: Digital Electronic Circuits

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