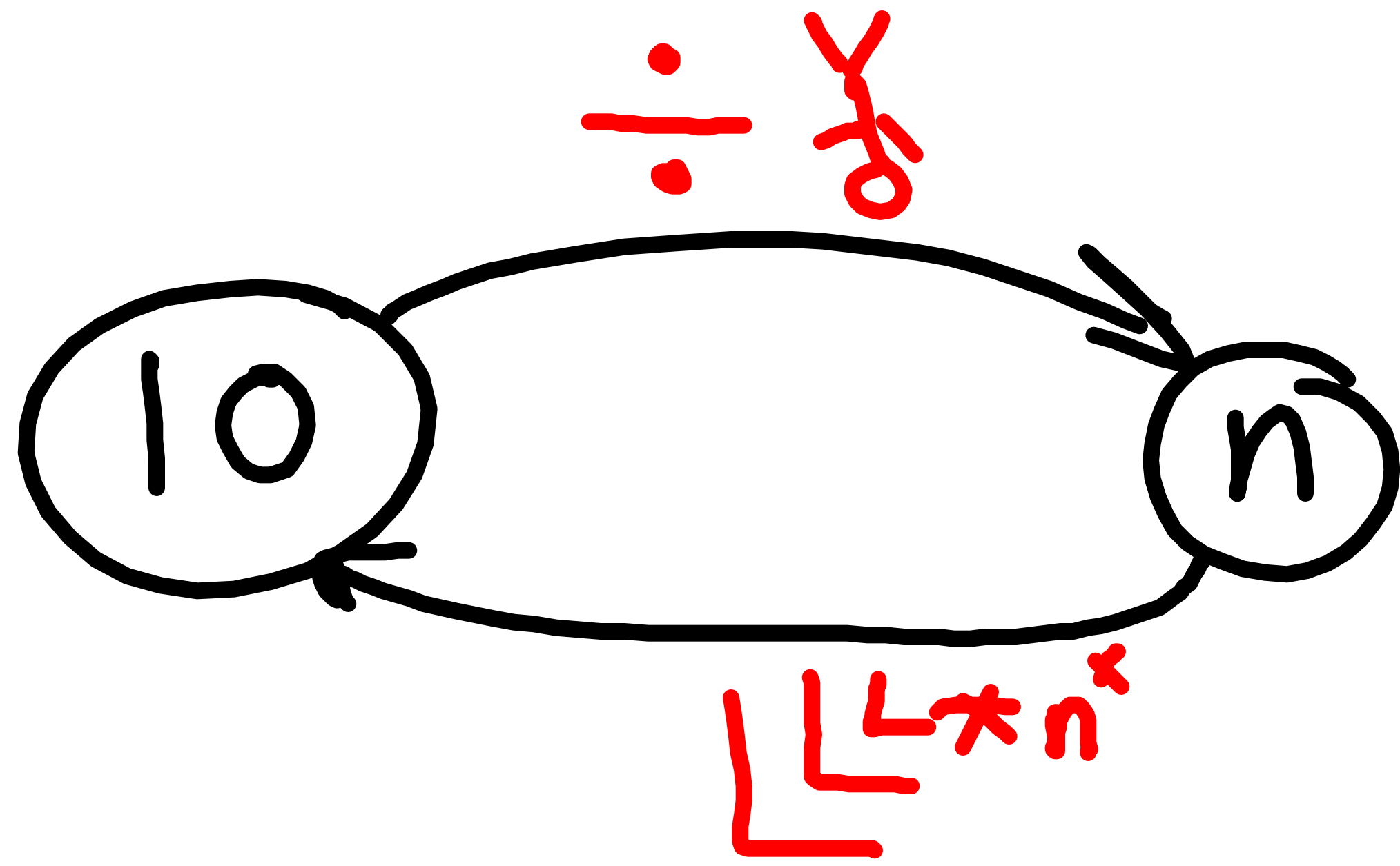


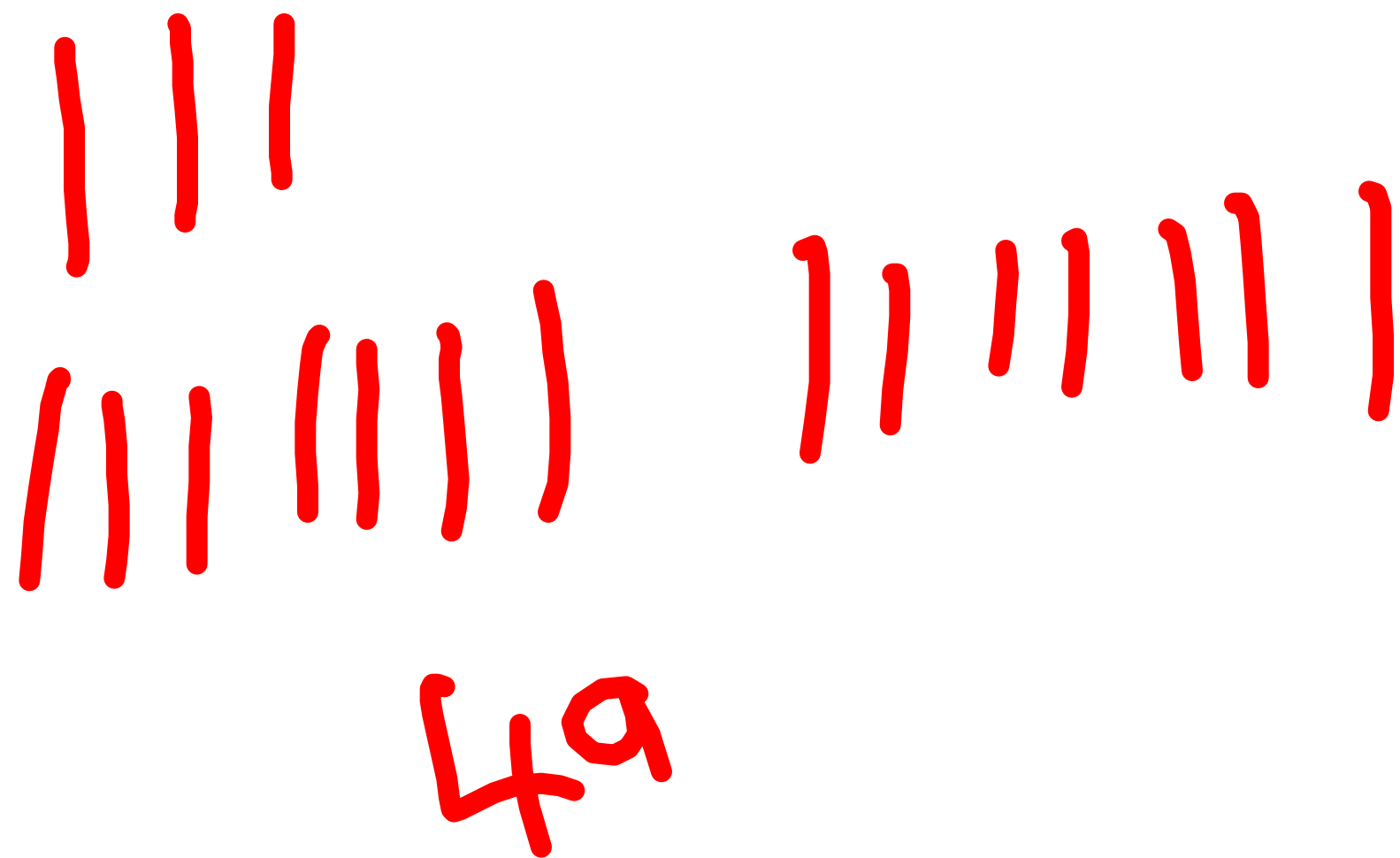
ECE 160 - Number Bases  
"there & back again"  
~ an engineers tale ~



$$\begin{array}{r}
 7^2 \quad 7^1 \quad 7^0 \\
 123 \mid_7 = 66 \mid_{10} \\
 49 \quad 7 \quad 1
 \end{array}$$

$$\begin{array}{r}
 10^2 \quad 10^1 \quad 10^0 \\
 \hline
 100 \quad 10 \quad 1 \\
 176 \mid_{10}
 \end{array}$$

# Positional systems





2557

$$321|_5 = 86|_{10}$$

$$\begin{array}{r} \left. \begin{array}{l} \left. \begin{array}{l} \left. \begin{array}{l} 1 \times 1 = 1 \\ 2 \times 5 = 10 \\ 3 \times 25 = 75 \end{array} \right\} \\ \hline 86 \end{array} \right\} \end{array} \right\} \end{array}$$

$$1234 \mid_{16} = ? \mid_{10}$$

4096 256

$$123|_{10} = ?|_6$$

323

$$\begin{array}{r}
 6 \overline{) 123} \\
 \underline{6 \overline{) 20}} \quad R3 \uparrow \\
 \underline{6 \overline{) 3}} \quad R2 \uparrow \\
 0 \quad R3 \uparrow
 \end{array}$$

$$234|_{10} = ?|_7$$

$$\begin{array}{r}
 7 \overline{) 234} \\
 \underline{7 \overline{) 33}} \quad R3 \uparrow \\
 \underline{7 \overline{) 4}} \quad R5 \\
 0 \quad R4
 \end{array}$$

$$453|_7$$

$$323$$

$$2711_{10} = ?_{16}$$

A	B	C	D	E	F
10	11	12	13	14	15

$$\begin{array}{r}
 16 \overline{) 271} \\
 \underline{164} \\
 171 \\
 \underline{96} \\
 15
 \end{array}$$

$$\begin{array}{r}
 16 \overline{) 271} \\
 \underline{16} \text{ R } 15 \\
 16 \overline{) 1} \text{ R } 0 \\
 \underline{0} \text{ R } 1
 \end{array}$$

$$\begin{array}{r}
 \uparrow \\
 \text{F} \uparrow \\
 \text{O} \uparrow \\
 \text{1} \uparrow
 \end{array}$$

$$10F \overline{) 16}$$

~~$$1015_{16}$$~~

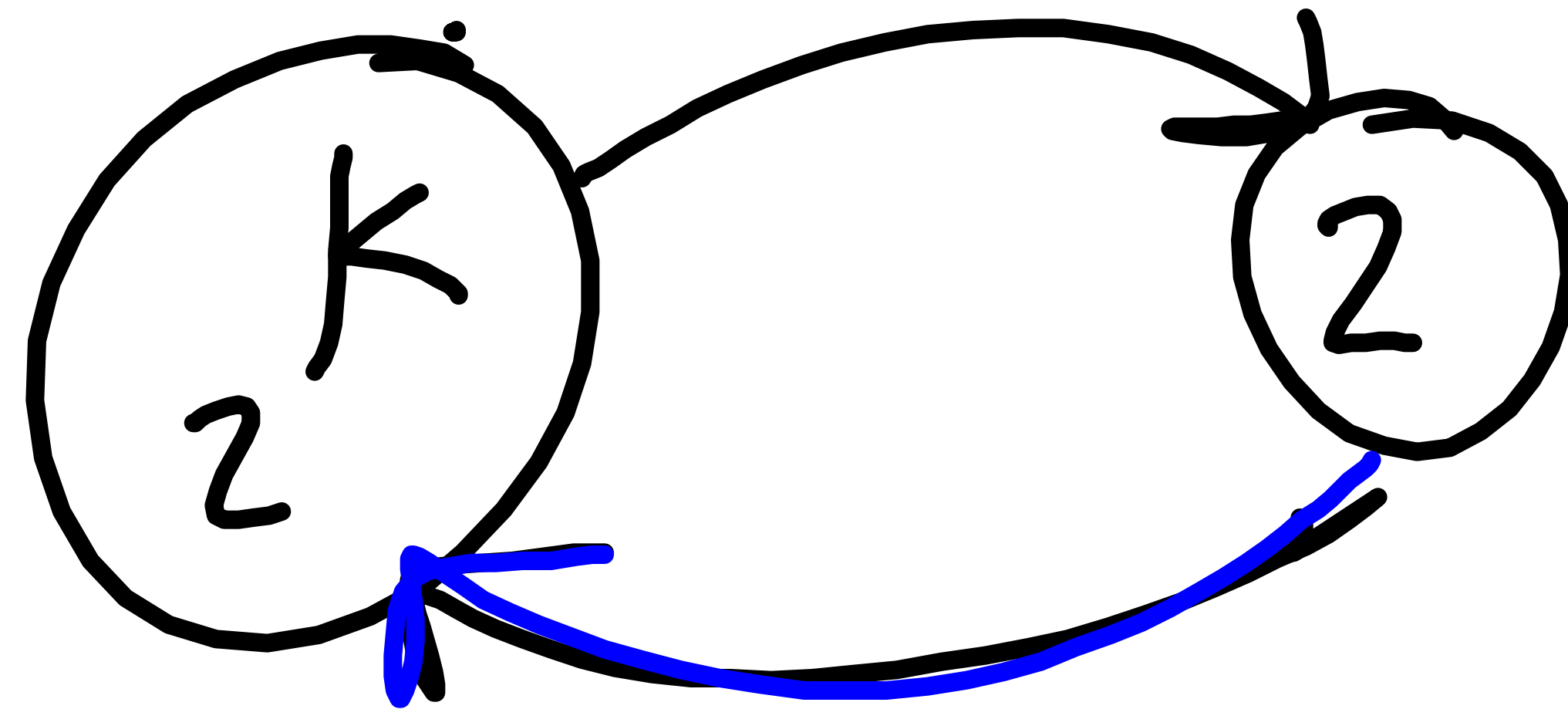
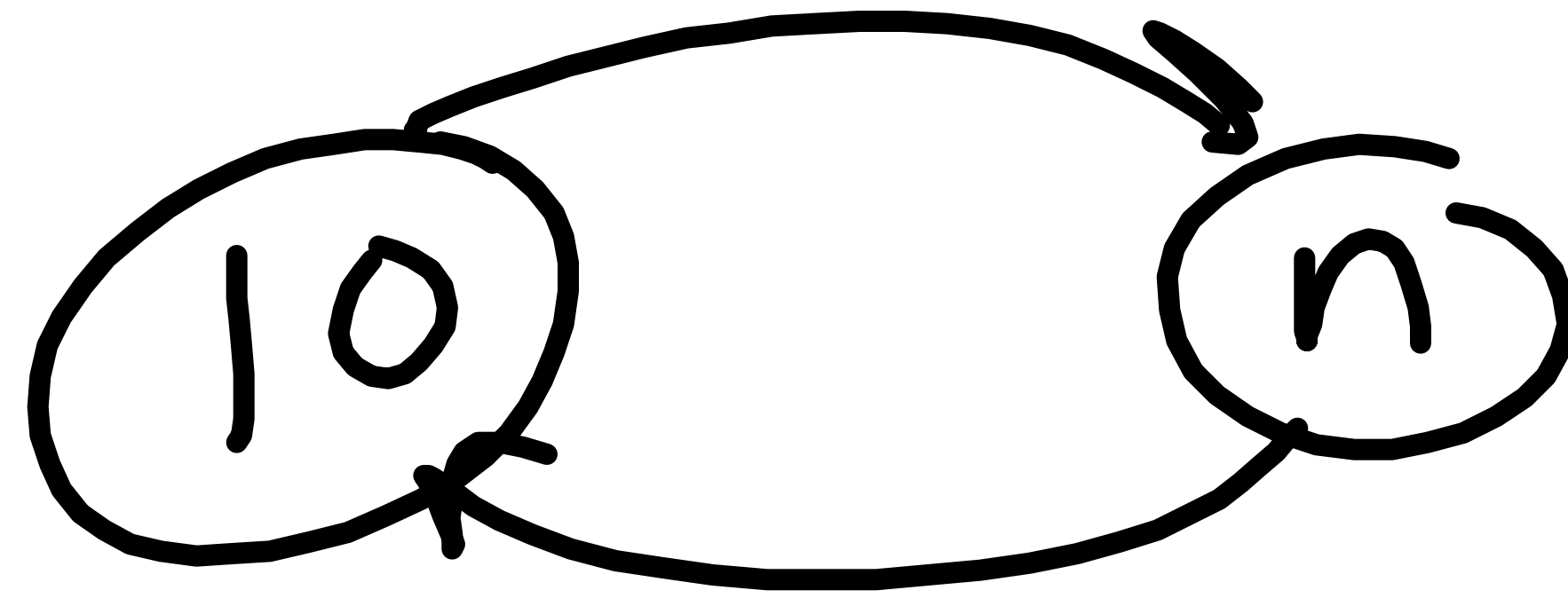


$$1 \cdot 16$$

$$2 \cdot 8$$

$$2 \cdot (4 \cdot 2)$$

$$2 \cdot 2 \cdot 2 \cdot 2 = 2^4$$



# SI Prefix

0

1

2

3

4

kilo <sup>1000</sup>  
mega <sup>1M</sup>  
g.g <sup>1B</sup>  
terra <sup>1tr</sup>

x

2

3<sup>2</sup>  
2

4 G

16  
2

0  
1  
2  
3

4

5

6

7

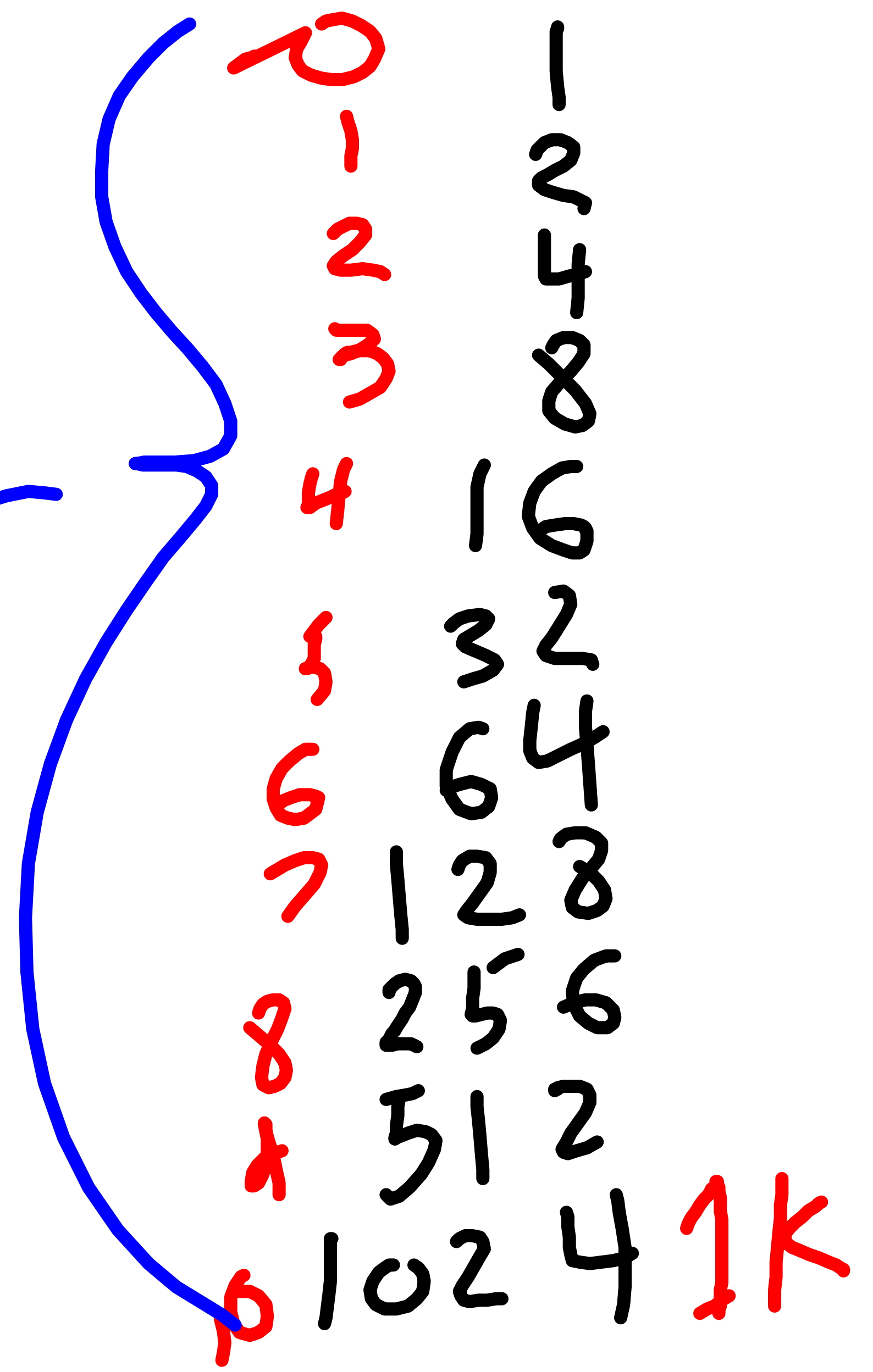
8

9

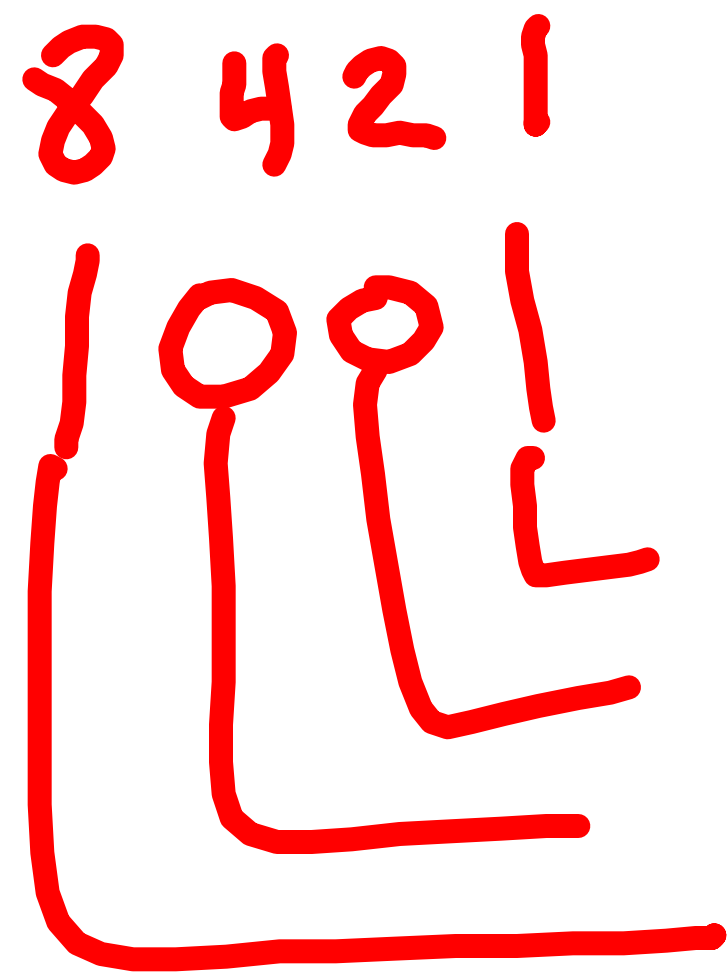
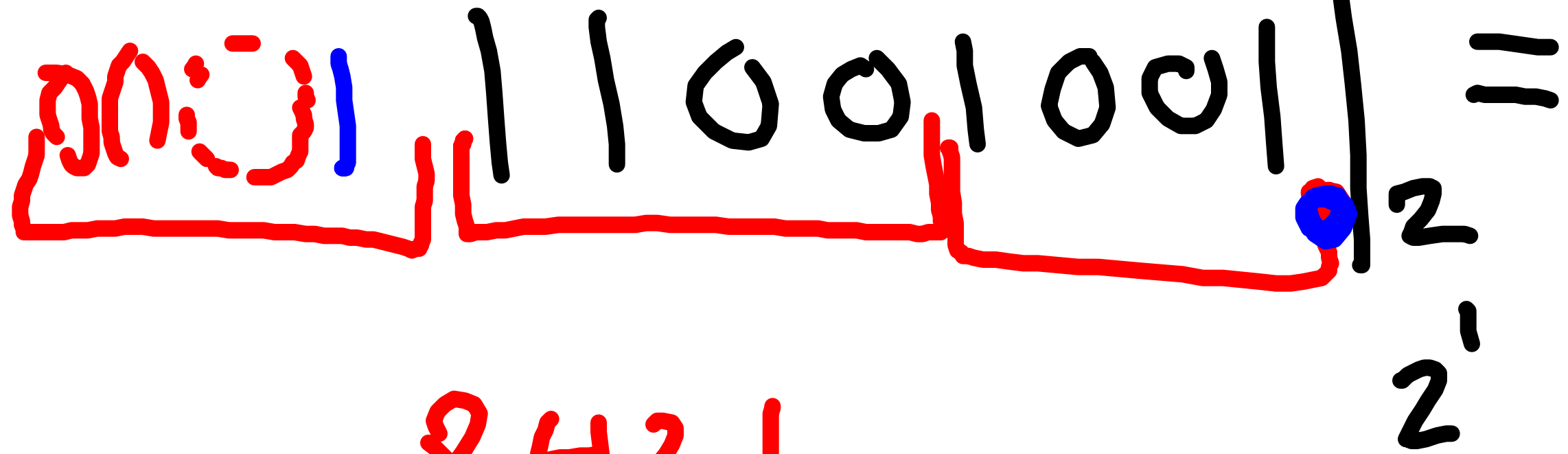
10

1  
2  
3  
4  
5  
6  
7  
8  
9  
10

1K



128 64 32 16 8 4 2 1



99

100

16 2<sup>4</sup> 1C9

0	0000	9	1001
1	0001	10	1010
2	0010	11	1011
3	0011	12	1100
4	0100	13	1101
5	0101	14	1110
6	0110	15	1111
7	0111		
8	1000		

9

$$\underbrace{1011}_{2} \underbrace{1111}_{2} = ?_{18}$$

1 3 7

137

~~137~~

