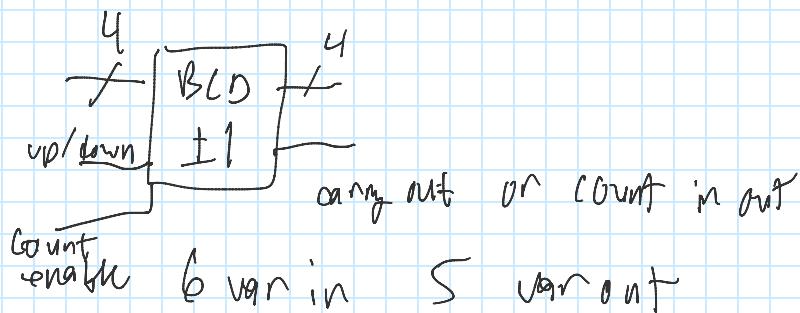


# Kemal Pulungan EE10a Set 2

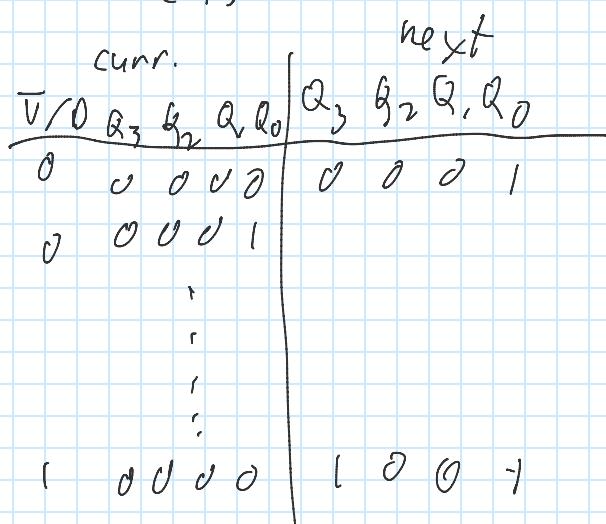
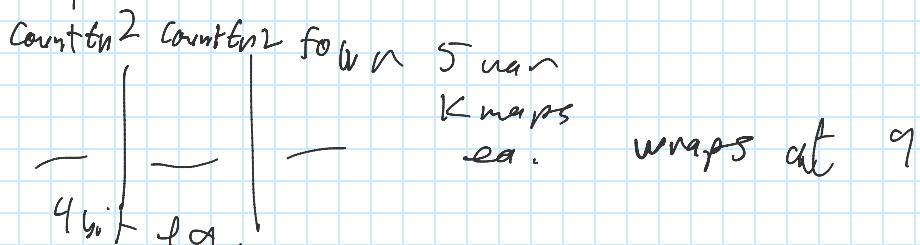
11 digits in 4097



Think of them like planes stacked upon

0 → recount

1 → count



for 100s & 10s counting  $\overline{V/D} \quad Q_{11/7} \quad Q_{6/6} \quad Q_{5/5} \quad Q_{4/4}$

CountEn is computed from prev. digits  $\overline{V/D}$

$$\text{Countfn1} = Q_3 \bar{Q}_2 \bar{Q}_1 Q_0 (\bar{U}_0) + \bar{Q}_3 \bar{Q}_2 \bar{Q}_1 \bar{Q}_0 (\frac{U}{0})$$

$$\text{Countfn2} = \left( Q_7 \bar{Q}_6 \bar{Q}_5 Q_4 (\frac{U}{0}) + \bar{Q}_7 \bar{Q}_6 \bar{Q}_5 \bar{Q}_4 (\frac{U}{0}) \right) \text{Countfn1}$$

Layer Q0 out		Q1*Q0			
		00	01	11	10
Q3*Q2	00	1			
	01	1	0	0	
	11	x	x	x	x
	10	1	0	x	x

Layer Q0 out		Q1*Q0			
		00	01	11	10
Q3*Q2	00	1			
	01	1	0	0	
	11	x	x	x	x
	10	1	0	x	x

U/D=0

Layer Q0 out		Q1*Q0			
		00	01	11	10
Q3*Q2	00	1			
	01	1	0	0	
	11	x	x	x	x
	10	1	0	x	x

U/D=1

$$Q_0 = \bar{Q}_1 \bar{Q}_2 + Q_1 \bar{Q}_2$$

$$Q_4 = \text{Countfn1} \left( Q_0 \text{ but sub in bitnum} \right) + Q_4 \overbrace{\text{Countfn1}}$$

$$Q_8 = \text{Countfn2} \left( Q_0 \text{ but sub in bitnum} \right) + Q_8 \overbrace{\text{Countfn2}}$$

Layer Q1 out		Q1*Q0			
		00	01	11	10
Q3*Q2	00	0	1	0	
	01	0	1	0	
	11	x	x	x	x
	10	0	0	x	x

Layer Q1 out		Q1*Q0			
		00	01	11	10
Q3*Q2	00	0	1	0	
	01	0	1	0	
	11	x	x	x	x
	10	1	0	x	x

U/D=0

Layer Q1 out		Q1*Q0			
		00	01	11	10
Q3*Q2	00	0	1	0	
	01	0	1	0	
	11	x	x	x	x
	10	1	0	x	x

U/D=1

$$Q_1 = \left( Q_1 \bar{Q}_2 + \bar{Q}_1 Q_0 \bar{Q}_3 \right) \bar{U}_0 + U_0 \left( \underbrace{Q_1 Q_0 + Q_3 \bar{Q}_1 \bar{Q}_2}_{\text{green}} + \underbrace{Q_2 \bar{Q}_1 \bar{Q}_0}_{\text{green}} \right)$$

$$Q_5 = \text{Countfn1} \left( Q_1 \text{ but sub in bitnum} \right) + Q_5 \overbrace{\text{Countfn1}}$$

$$Q_9 = \text{Countfn2} \left( " " " " " \right) + Q_9 \overbrace{\text{Countfn2}}$$

Layer Q2 out		Q1*Q0				
		00	01	11	10	
Q3*Q2		00	0	0	1	0
01		1	1	0	x	
11		x	x	x	x	
10		0	0	x	x	

U/D=0

Layer Q2 out		Q1*Q0				
		00	01	11	10	
Q3*Q2		00	0	0	1	0
01		0	1	1	0	
11		x	x	x	x	
10		1	0	x	x	

U/D=1

$$\bar{Q}_2 = \bar{V}_b \left( \bar{Q}_3 \bar{Q}_1 \bar{Q}_0 + \bar{Q}_3 Q_2 Q_1 \bar{Q}_0 + \bar{Q}_1 Q_2 \right)$$

$$+ V_b \left( Q_3 \bar{Q}_1 \bar{Q}_0 + Q_2 Q_1 + Q_2 Q_0 \right)$$

$$Q_6 = \text{CountEn1} \left( Q_2 \text{ but sub in bitmap} \right) + Q_6 \overbrace{\text{CountEn1}}$$

$$Q_{10} = \text{CountEn2} \left( " " " " " \right) + Q_{10} \overbrace{\text{CountEn2}}$$

Layer Q3 out		Q1*Q0				
		00	01	11	10	
Q3*Q2		00	0	0	0	0
01		0	0	1	0	
11		x	x	x	x	
10		1	0	x	x	

U/D=0

Layer Q3 out		Q1*Q0				
		00	01	11	10	
Q3*Q2		00	1	0	0	0
01		0	0	0	0	
11		x	x	x	x	
10		0	1	x	x	

U/D=1

$$Q_3 = \left( Q_3 \bar{Q}_1 \bar{Q}_0 + Q_2 Q_1 Q_0 \right) \bar{V}_b + \left( \bar{Q}_3 \bar{Q}_2 \bar{Q}_1 \bar{Q}_0 + Q_3 Q_0 \right) V_b$$

$$Q_7 = \text{CountEn1} \left( Q_3 \text{ but sub in bitmap} \right) + Q_7 \overbrace{\text{CountEn1}}$$

$$Q_{11} = \text{CountEn2} \left( " " " " " \right) + Q_{11} \overbrace{\text{CountEn2}}$$