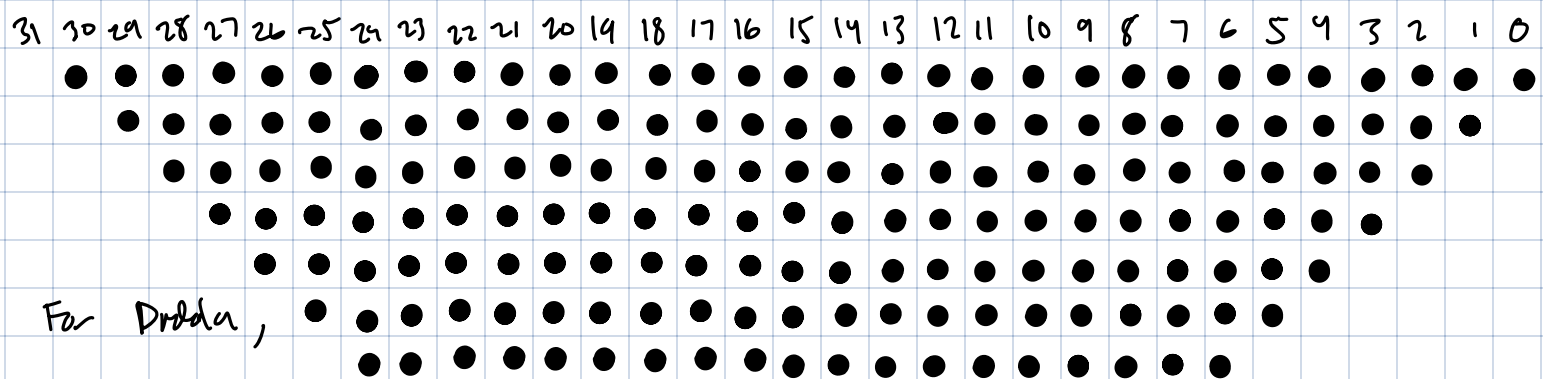
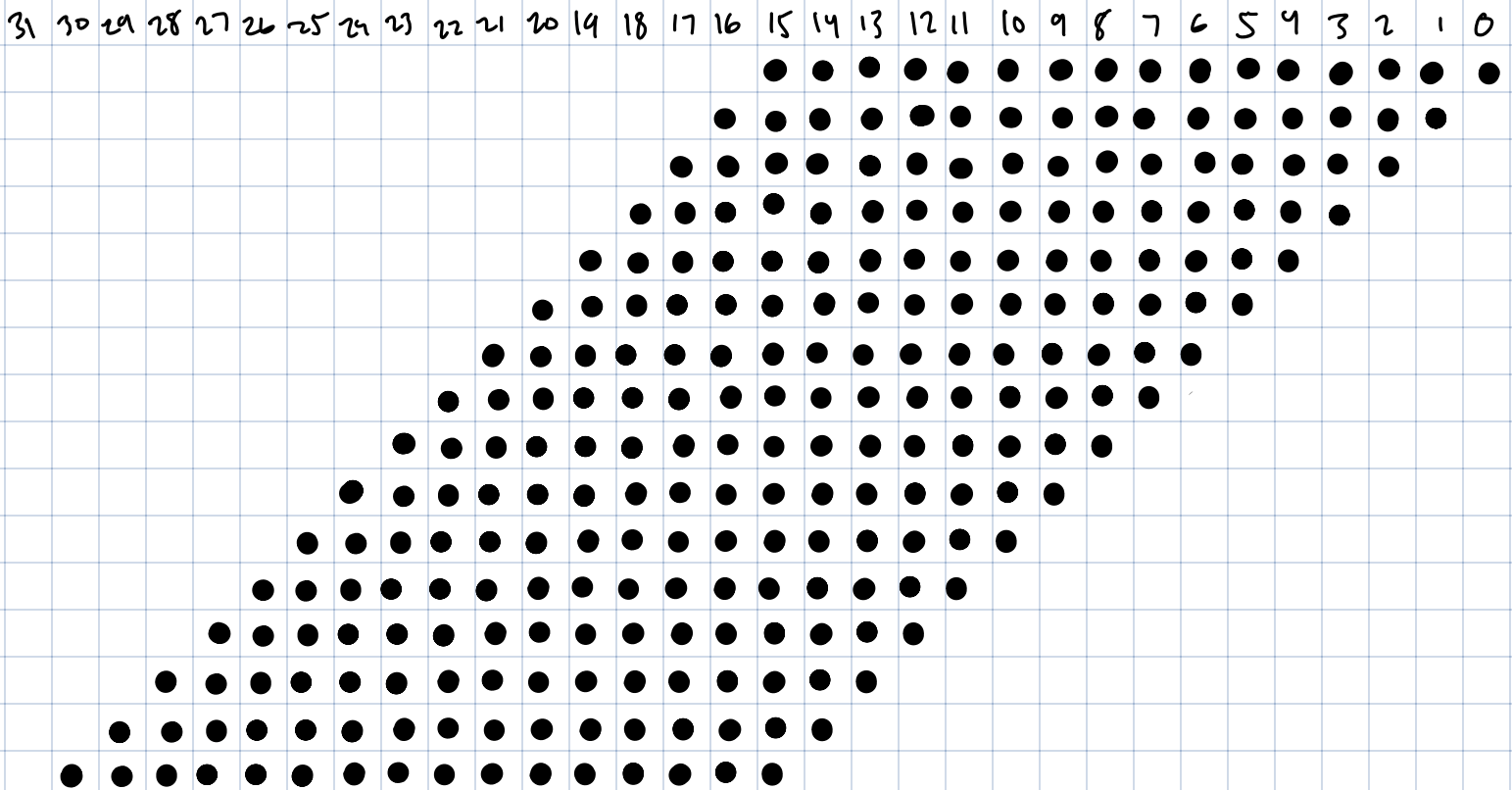


Carson Sager
7 April 2024

HWS

① *SV files included in turn-in (SV, Hb, DO, etc.) *

②



For Dredda,

$$\text{height}_0 = 2$$

$$h_1 = \lfloor 2 \times 3/2 \rfloor = 3$$

$$h_2 = \lfloor 3 \times 3/2 \rfloor = 4$$

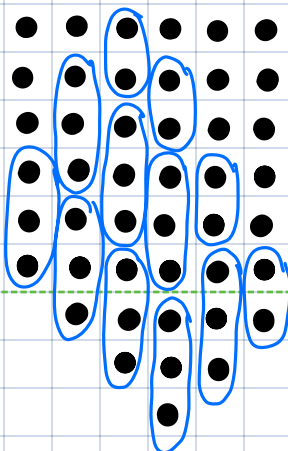
$$h_3 = \lfloor 4 \times 3/2 \rfloor = 6$$

$$h_4 = \lfloor 6 \times 3/2 \rfloor = 9$$

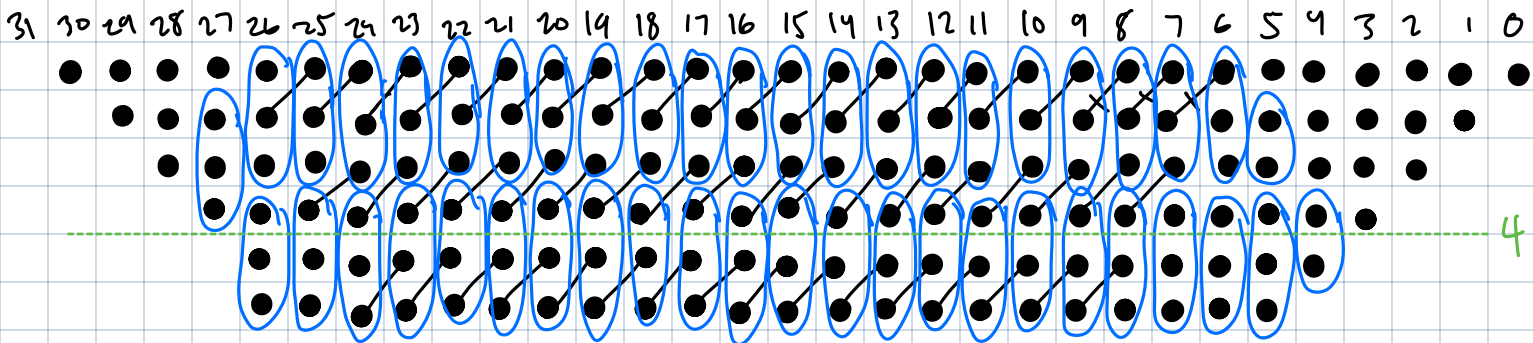
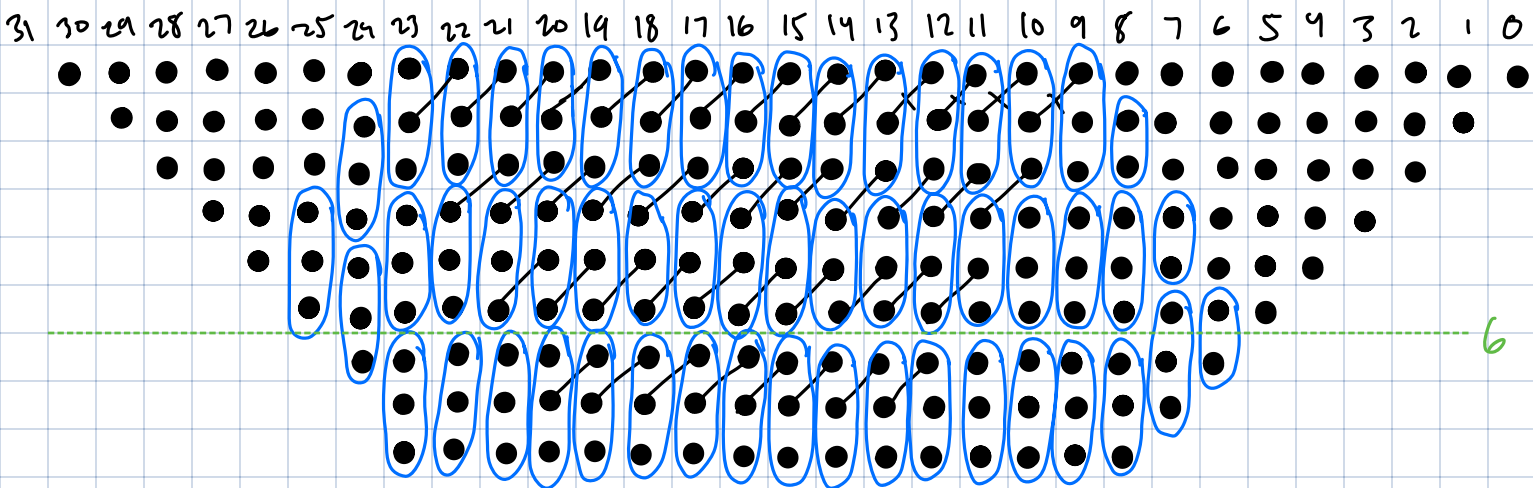
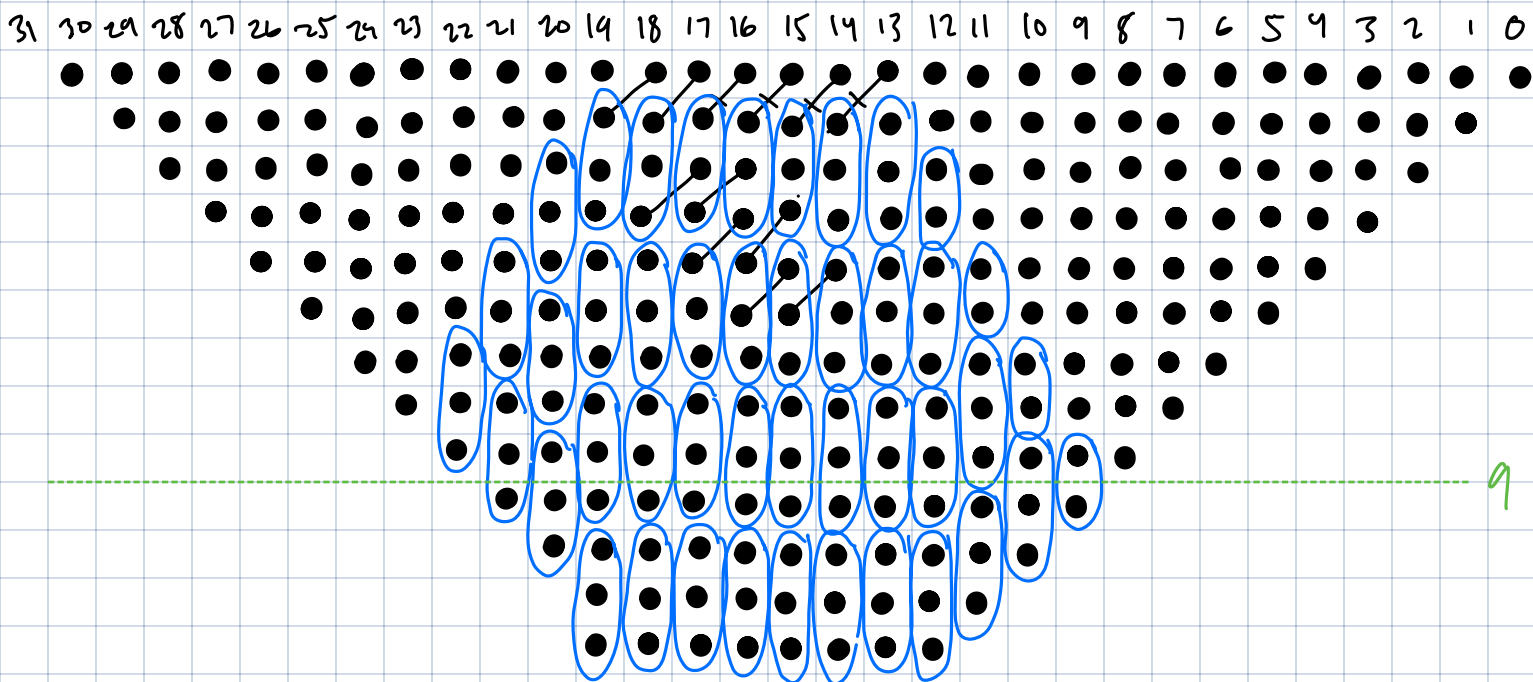
$$h_5 = \lfloor 9 \times 3/2 \rfloor = 13$$

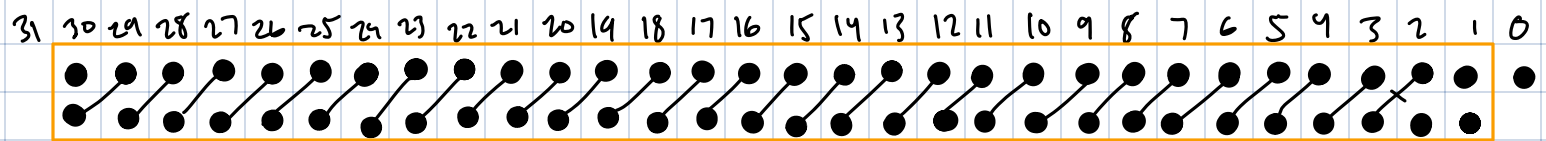
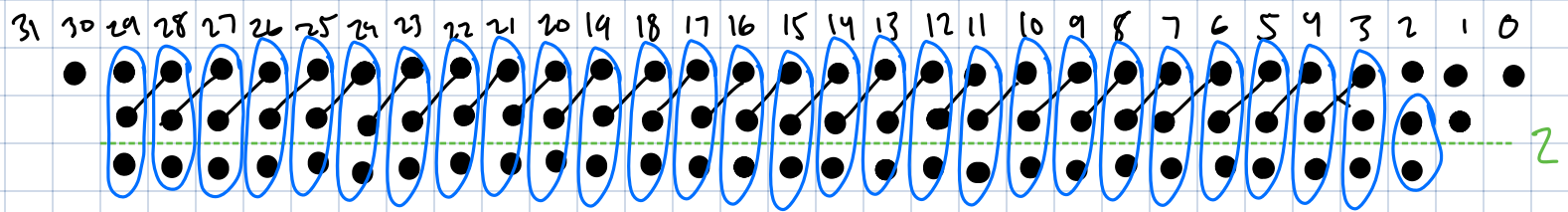
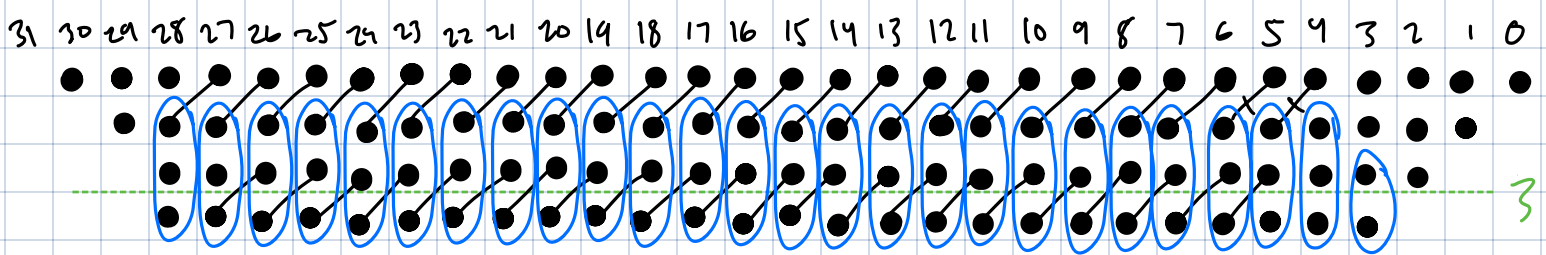
$$h_6 = \lfloor 13 \times 3/2 \rfloor = 19 \quad \times$$

\therefore We will have 6 levels following this level (Will have $h=13$ for next level)



13





30-bit CPA

Delay : Partial product (pp) generation: $1 \Delta = 1 \Delta$
 6 FA delay between steps: $6 \cdot 6 \Delta = 36 \Delta$
 CPA delay using RCA: $(2n + 4) \Delta = (2(30) + 4) = 64 \Delta$

$$\text{Total Delay} = 1 + 36 + 64 = \boxed{101 \Delta}$$

Area:

Stage	FA	HA
1	8	4
2	40	4
3	51	3
4	44	2
5	25	1
6	27	1

Total: 195 15

$$\text{FA equation} = n^2 - 4 \cdot n + 3 \\ = 16^2 - 4 \cdot 16 + 3 = \underline{195} \text{ (matches)}$$

$$\text{HA equation} = n - 1 \\ = 16 - 1 = \underline{15} \text{ (matches)}$$

Total area: AND gates = $n^2 = 16^2 = 256$
 Full Adders = $195 \cdot 9 = 1755$
 Half Adders = $15 \cdot 4 = 60$
 (Stage 7) 30-bit RCA = $9n = 9 \cdot 30 = 270$

2341 Gates