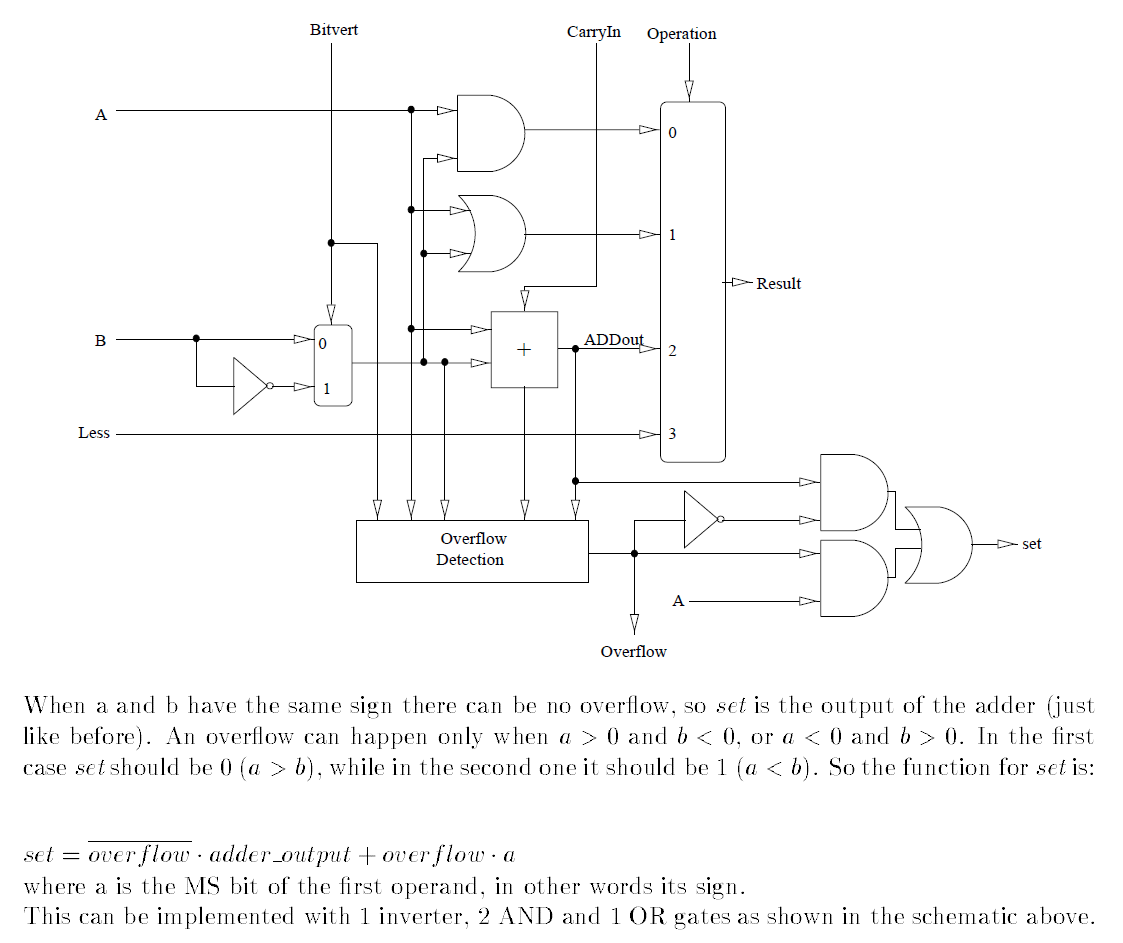
B.24



B.26

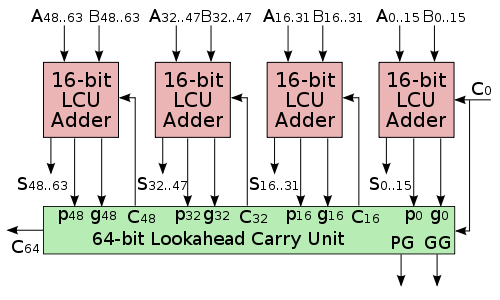
C4 = G3,0 + C0 P3,0

C8 = G7,4 + G3,0 P7,4 + C0 P3,0 P7,4

**C12** = G11,8 + G7,4 P11,8 + G3,0 P7,4 P11,8 + C0 P3,0 P7,4 P11,8

C16 = G15,12 + G11,8 P15,12 + G7,4 P11,8 P15,12 + G3,0 P7,4 P11,8 P15,12 + C0 P3,0 P7,4 P11,8 P15,12

B.27



C16 = G15,0 + C0 P15,0

C32 = G31,16 + G15,0 P31,16 + C0 P15,0 P31,16

C48 = G47,32 + G31,16 P47,32 + G15,0 P31,16 P47,32 + C0 P15,0 P31,16 P47,32

C64 = G63,48 + G47,32 P63,48 + G31,16 P47,32 P63,48 + G15,0 P31,16 P47,32 P63,48 + C0 P15,0 P31,16 P47,32 P63,48

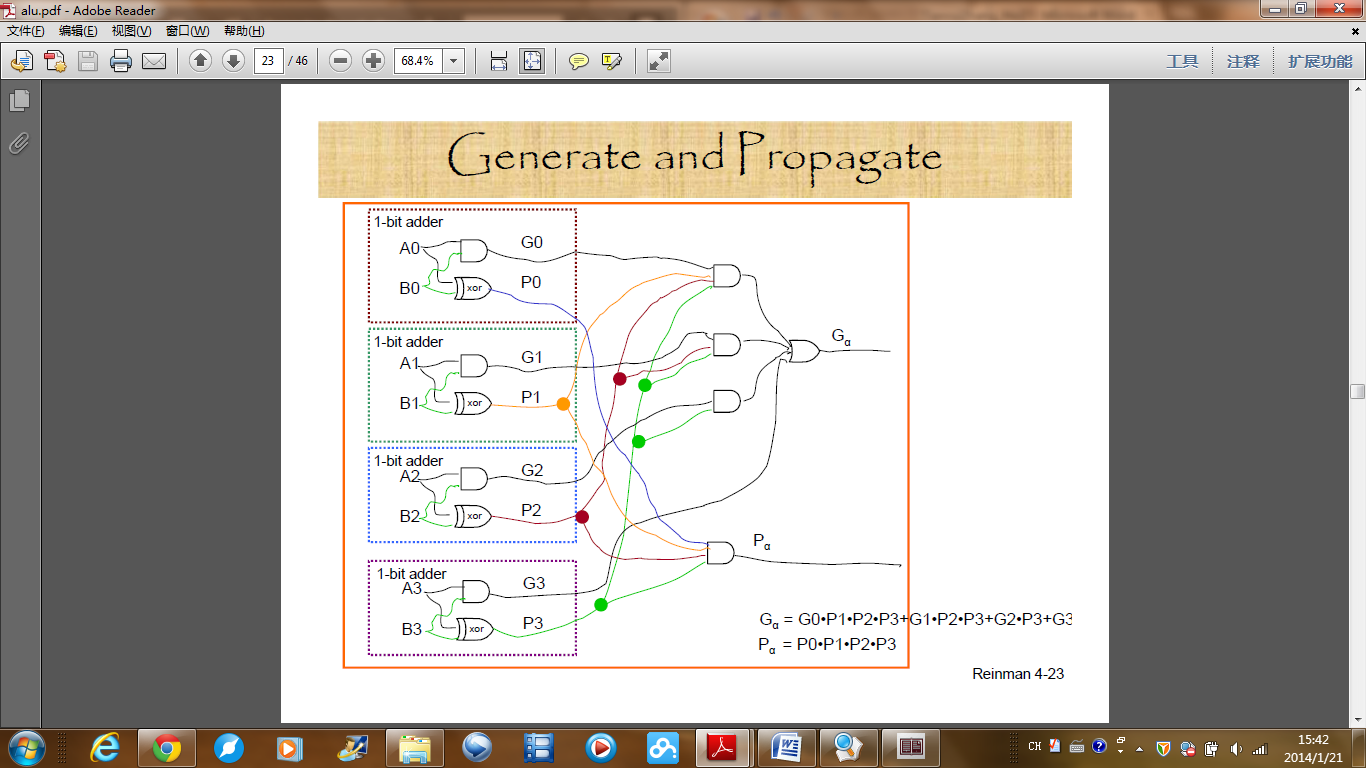
B.30   
A. Ripple adder only: 64\*2T=128T

B. Ripple carry of 4-bit groups that use carry lookahead: 3T+2T\*(16-1)=33T

C. Ripple carry of 16-bit groups with CLA: 3T\*(64/16)=12T

D. HCLA

Although the diagram below is for 4 bit HCLA, the principles are the same.



It takes additional 2 levels of gates to produce the final results. Therefore, in total, we will have delay 5T.