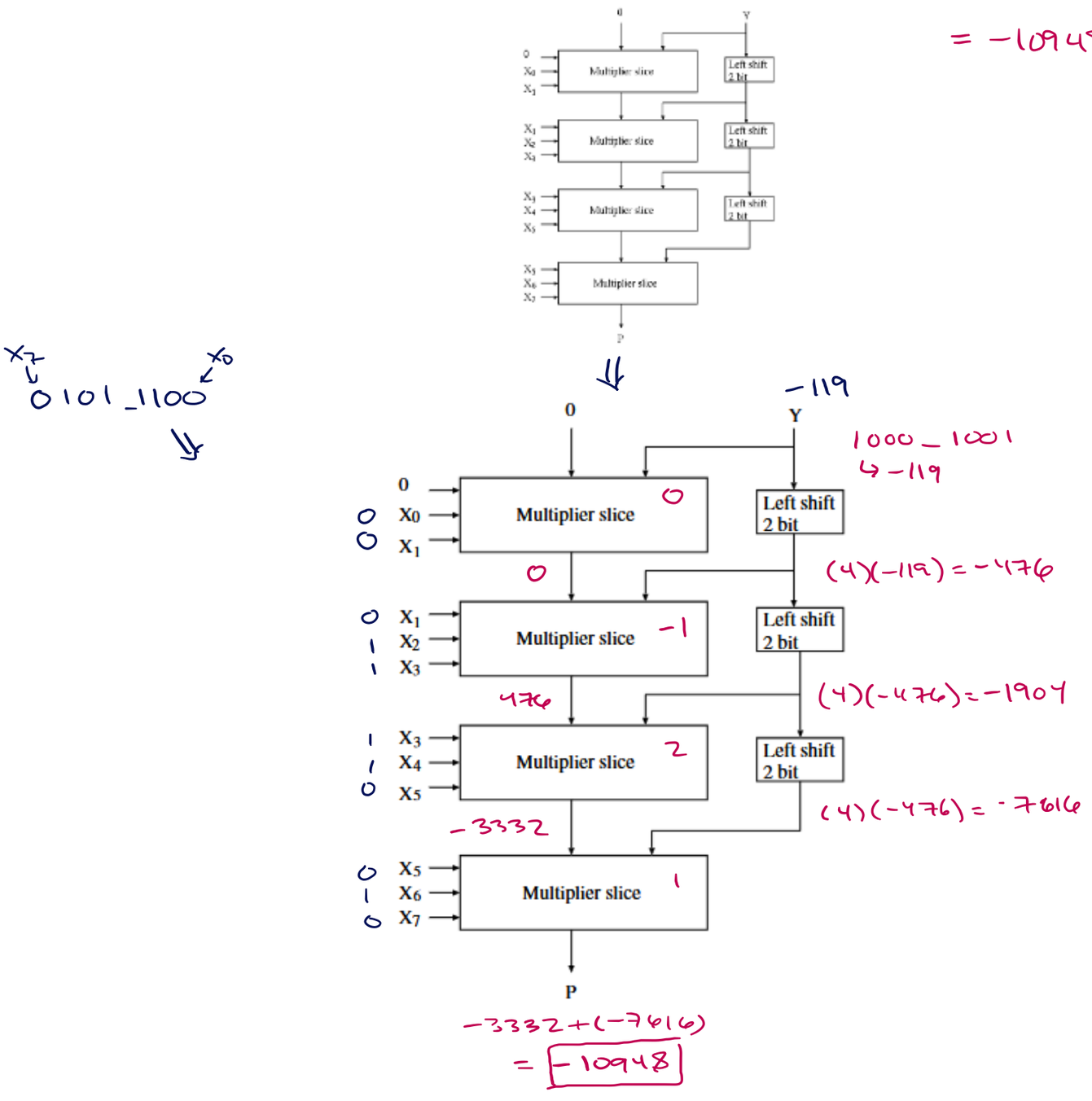
ECE428 HW5 C. LOTITO 04/06/2025

1. Assume the Booth multiplier shown below is used to compute 0101 1100 × 1000 1001. Show the output of each multiplier slice. (50)

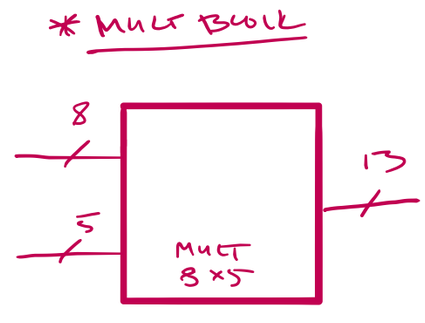
92 × −119 = −10948

1000 1001 = 0111 0110 + 1 = (0111 0111) = 119



2. Use two 8-bit×5-bit signed multipliers (multiplying 2's complementary numbers) and a 15-bit adder to construct an 8-bit×8-bit signed multiplier. Draw the block diagram. Use it to compute 0101 1100 × 1000 1001. Show the output of each of block (sub multipliers and the adder). (50)

92 × −119 = −10948



A[7:0] = 0101_1100 = 92

B[7:0] = 1000_1001 = −119

$$A[7:0]\cdot B[7:0] = \left(A[7:4]\cdot 2^4 + \{0, A[3:0]\}\right)\cdot B[7:0]$$

$$= (A_7A_6A_5A_4A_3\cdot 2^3 + 00A_2A_1A_0)\,B[7:0]$$

$$= A_7A_6A_5A_4A_3\cdot 2^3\cdot B[7:0] + 00A_2A_1A_0\cdot B[7:0]$$

$$= A[7:3]\cdot 2^3\cdot B[7:0] + 00A[2:0]\cdot B[7:0]$$

5-bit, L.S. 3, 8-bit, 5-bit, 8-bit