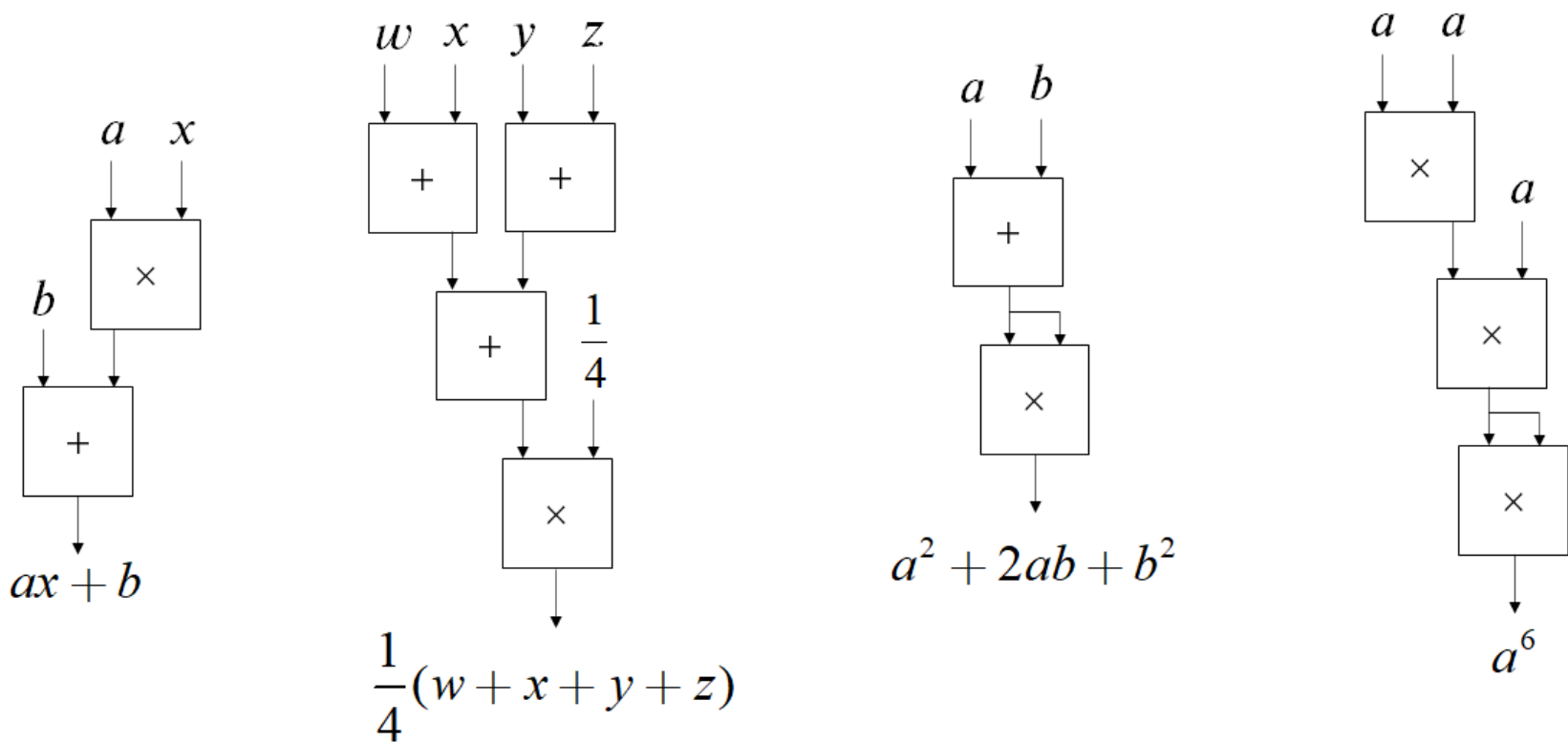


Homework 1

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Problem. 1

We have an assumption that the output signal can be copied as two input signals.



Problem. 2

a. We're required to find such an smallest n , which meets the conditions below.

$$2^n \geq 400$$

Considering n is an integer, so

$$n = \lceil \log_2 400 \rceil = 9$$

b. Nine bits can represent 512 students, so let s be what we want

$$s = 2^9 - 400 = 112$$

Problem. 3

a. 00010110 b. 11111101 c. 11111000 d. 00000001

Problem. 4

- a. $01 + 1011 = 0001 + 1011 = 1100$
- b. $11 + 01010101 = 11111111 + 01010101 = 01010100$
- c. $0101 + 110 = 0101 + 1110 = 0011$

d. $01 + 10 = 11$

Problem. 5

a. $(01010101)_B = (85)_D$

b. $(10001101)_B = (-115)_D$

c. $(10000000)_B = (-128)_D$

d. $(11111111)_B = (-1)_D$

Problem. 6

$$(0.3)_D = (0.01001100110\dots)_B = 1.001100110\dots \times 2^{-2}$$

It's a postive number, so the sign bit will be 0. The exponent part is unsigned integer 125's 8-bit binary form, 01111101. And the fraction part is 001100110....

Answer: 0 01111101 001100110...

Problem. 7

Sign : Negative

Exponent : 10000010 = 130, represents 3.

Fraction :

$$1010100110\dots = (\frac{1}{2})^1 + (\frac{1}{2})^3 + (\frac{1}{2})^5 + (\frac{1}{2})^8 + (\frac{1}{2})^9 = 0.662109375$$

Answer :

$$(-1) \times 1.662109375 \times 2^3 = -13.296875$$

Problem. 8

$$\begin{array}{r} \text{x90A} \\ + \text{x4123} \\ \hline \text{x4A2D} \end{array}$$

Problem. 9

a. $\text{xABCD OR x9876} = \text{xBBFF}$

b. $\text{x1234 XOR x1234} = \text{x0000}$

c. $\text{xFEED AND (NOT(xBEEF))} = \text{x4000}$

Problem. 10

X	Y	Z	Q ₁	Q ₂
0	0	0	0	1
0	0	1	0	1
0	1	0	0	1
0	1	1	0	1
1	0	0	1	1
1	0	1	1	1
1	1	0	1	1
1	1	1	0	0

Problem. 11

- a. $(25675)_{\text{D}} = (644\text{B})_{\text{H}}$
- b. $(675.625)_{\text{D}} = (1010100011.101)_{\text{B}} = 1.010100011101 \times 2^9$

IEEE 754 format : 0 10001000 010100011101000000000000

Hexadecimal representation : 4428E800
- c. $(\text{Hello})_{\text{ASCII}} = (48\ 65\ 6\text{C}\ 6\text{C}\ 6\text{F})_{\text{H}}$