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CSE 230

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Assignment 8:

1. 0111 x 0101

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Iteration | Step | Multiplicand register value | Multiplier Register Value | Product Register Value |
| 0 | Initial Values | 0111 | 0101 | 0 |
| 1 | 1. Prod = Prod + Multiplicand  2. sll Multiplicand by 1  3. srl Multiplier by 1 | 01110 | 010 | 0+0111=  0111 |
| 2 | 1. sll Multiplicand by 1  2. srl multiplier by 1 | 011100 | 01 | 0111 |
| 3 | 1. Prod = Prod + Multiplicand  2. sll Multiplicand by 1  3. srl multiplier by 1 | 011100 | 0 | 0111+011100=  0100011 |
| 4 | 1. sll Multiplicand by 1  2. srl multiplier by 1 | 0111000 | - | 0100110 |

Final Product: 0100110 base 2 or 35 base 10

1. 0000 0111 ÷ 0101

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Iteration | Step | Quotient | Divisor | Remainder |
| 0 | Initial Value | 0000 0111 | 0101 0000  (sll to 8bit) | 0000 0111 |
| 1 | 1 Rem = Rem-Div  2 Rem<0, Rem+Div  Sll Quotient, Q0 = 0  3 slr Div | 0000 1110 | 0010 1000 | 0000 0111 |
| 2 | 1 Rem = Rem – Div  2 Rem < 0, Rem += Div, sll Q0, Q0 = 1  3 slr Div | 0001 1100 | 0001 0100 | 0000 0111 |
| 3 | 1 Rem = Rem – Div  2 Rem < 0, Rem += Div, sll Q0, Q0 = 1  3 slr Div | 0011 1000 | 0000 1010 | 0000 0111 |
| 4 | 1 Rem = Rem – Div  2 Rem < 0, Rem += Div, sll Q0, Q0 = 1  3 slr Div | 0111 0000 | 0000 0101 | 0000 0111 |
| 5 | 1 Rem = Rem – Div  2 Rem >= 0, sll Q, Q0 = 0  3. srl Div | 1110 0000 | 0000 0010 | 0000 0010 |

Result = 00000010 or 2

1. Convert -3964 ten into a 32-bit two's complement binary number.

1111 0111 1100 = positive 3964

1 0000 1000 0100= twos compliment, from the right go skip until first 1, then invert all bits after that

11111111111111111111000010000100 = -3964 as 32 bit

1. What decimal number does this two's complement binary number represent:  1111 1111 1111 1111 1111 0111 1100 0110 two   ?

Positive bin:

0000 0000 0000 0000 0000 1000 0011 1010

Number in Decimal = 2106

1. (2 pts) What would the number 8671.42578125 ten be in IEEE 754 single precision floating point format.
2. 10000111011111.01101101
3. 1. 000011101111101101101x2^13
4. 10001010
5. 01000101000001110111110110110100 binary, 45077DB4 hex
6. (2 pts) What would the number -6741.421875 tenbe in IEEE 754 single precision floating point format.
7. 1101001010101.011011
8. 1.101001010101011011x2^12
9. 10001100
10. 11000110010100101010101101100000 binary, C652AB60 hex

7) (2 pts) What decimal number would the IEEE 754 single precision floating point number 0xC48E76C0 (this is in hex) be? Write your final answer in scientific notation as m x  10 p where p is an integer.

1.1397109375 x 10^3

8) (2 pts) For this problem, assume 5 bits precision. Add two binary numbers,

1.1011 two x 2 -9  and 1.0111 two x 2 -7  by showing the following steps:

a) 1.1011x2^-9 + 101.1100x2^-9

b) 1010.0111 x 2^-9

c) 1.0100111 x 2^-6

d) 1.0100 x 2^-6

9) (2 pts) For this problem, assume 5 bits precision. Multiply binary two binary numbers,

1.1011 two x 2 -9  and 1.0111 two x 2 -7

a) -16

b) 1001101

c) 1.001101 x 2^-17

d) 1.0011 x2^-17

10) (2 pts) Add 7.84 ten x 10 10 to 5.79 ten x 10 12 ,

a) 5.8684 x 10^12

b) 5.86 x 10^12