(1) Base conversions -> division - remain der -> bigger exponent to smaller exponent

a)
$$588_{10} = \frac{2|02|0}{3|05|0}$$
 3

A) $3|588 | 0$
 $3|9|0 | 1$
 $3|05 | 2$
 $3|2| | 0$
 $3|2| | 2$
 $2|02|03$

2) Base conversions 7 division-remainder 7 smaller exponent to bigger exponent

a)
$$20012_3 = \frac{107}{10}$$

A)
$$20012_3 = X_{10}$$

 $2 \times 3^4 + 0 \times 3^3 + 0 \times 3^2 + 1 \times 3^1 + 2 \times 3^0$
 $= 2 \times 81 + 0 \times 27 + 0 \times 9 + 1 \times 3 + 2 \times 1$
 $= 102 + 0 + 0 + 3 + 2$
 $= 167_{10}$

b)
$$4103_5 = 528_{10}$$

B)
$$41035 = \frac{125}{424}$$

 $4 \times 5^{3} + 1 \times 5^{2} + 0 \times 5^{1} + 3 \times 5^{\circ}$
 $= 4 \times 125 + 1 \times 25 + 0 \times 5 + 3 \times 1$
 $= 500 + 25 + 0 + 3$
 $= 52810$

3 decimal fractions to binary

a) 25.84375

d) 84.874023

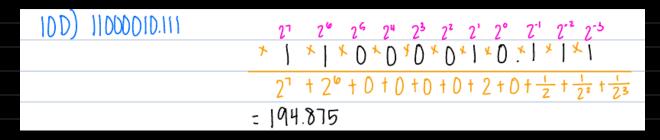
· the decimal part	the fravion part
2 <u>25</u> 1 2 <u>12</u> 0	0.84375
2 12 0	3 , 2 jnttger is 1 1.68750
2 <u>0</u> 0 2 <u>3</u> 1	1.08750
2 1	10.7.7
D	0. 68750
buttam to top 11001	$\frac{x}{1.37500}$ in Hager is 1
	1.37500
	107500
	0.37500
	0.37500 * 2 integer is 0 0.75000
	0.15000
	h 2 E 4 0 0
	0.75000
	x 2 integer is 1
	1.5000
	0.50000
	2 integer is 1
	1.00000 integer is 1
	1.0000
	0.00000
	x 2 jyithur is n
	x 2 integer is 0
	y. 0 0 0 0 0
10	p to buttom 110110
[1001.110110	
1102.7.0110	

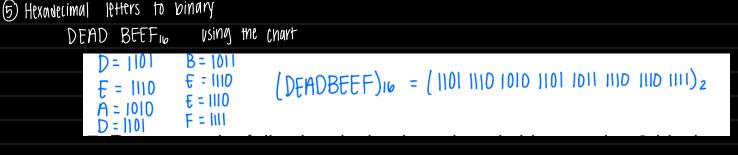
+ the decimal part 2 84 0 2 42 0 2 22 1 2 10 0 2 5 1 2 2 0 2 1 1 0 from bottom to tak 1010100	- on part 0.874023 1.748046 0.748046 3.748046 1.496092
2 42 0 2 21 1 2 10 0 2 5 1 2 2 0 2 1 1	2 integer is 1 1.748046 0.748046 x. , , , , , , , 2 integer is 1
2 2 1 1 2 10 0 2 5 1 2 2 0 2 1 1	0.748046 x. , , , 2 integer is 1
2 10 0 2 5 1 2 2 0 2 1 1	0.748046 x. , 2 integer is 1
2 5 1 2 2 0 2 1 1	x, 2 integer is 1
2 2 0 2 1 1	x, 2 integer is 1
2 1 1	
0	1.496092
·	
from bottom to top 1010100	
	0.496092
	* 2 integer is 0
	0.992184
	0.992184
	× 2 integer is 1
	1.984368
0.	984368
Χ,	2 jnteger is 1
	0 6 7 2 6
0. 9	08730
*	2 integer is 1
	3 7 4 7 2
from top to 1	MHM HALL
	11011 MOTAN
1010100:110(11	ווטון ייאטונען
	ן ווטוון יישונען
1010100-110(11	

4) convert binary fractions to necimal

a) 10111.1101

d) 11000010.111





D=1	0 F-				
6 decimal to sign	ed-magnitud	? , one	s complement	, two's complemen	t representation
a) 60			signed - magnitude	one's complement	two's complement
b) -60		60	00111100	00111100	00111100
c) 20		-60	10111100	11000011	11000100
d) -20		20	00010100	0010100	00010100
u) -20		-20	10010100	111010111	11101100
179) 60	2/60 0			176) - 60	2/60 0
positive number	2 30 0 2 15 1			negative	2 30 0 2 115 (
P 0011112	2[7]			יוטאואינו	2 7 1
	2[3]				2 3

	4
2[3]	2 3 1
2 1	2 1
0	0
buttam to tap 111100	bottom to top 111100
80, 60 in binary is 111100	80, 60 in binary is 111100
50, 60 in normal binary is 00111100 ← flip backmands???	50, 60 in normal binary is 00111100 ← flip backwards???
ONE'S COMPIEMENT: DOTTIOO	Signed - magnitude: set I as the farthest-left bit, since
two's complement: 00111100	its a negative number
signed - magnitule: 00[[1100	DOILIOD BECOMES TOTTIOD
	OME'S complement: flip I's to 0's and 0's to I's
	00111100 flips to 11000011
	two's comprement: add to the above reports
	11000011 + 1 = 11000100
	11000001
17C) 20 2120 0	I7D) -20 2 20 0
positive number 2 10 0	negative 2 10 D
2 5 1	number 2 5 1
2 2 0	2 2 0
2 1	2 1
0	0
pottam to top 10100	bottom to top 10100
80, 20 in binary is 10100	80, 20 IN binary is 10100
PU, 20 IN normal binary is 00101 & flip powerates???	PU, 20 IN normal binary is 00010/002 flip buremands????
OYIE'S COMPLEMENT : 00010100	Signed-magnitude: set I as the farthest-left bit, since
TWO'S COMPLEMENT : DODIOLOD	its a negative number
Signed - magnitule: 00010100	00010100 becomes 10010100
	ONE'S COMPLEMENT: Flip I's to 0's and 0's to I's
	00010100 becomes 11101011
	two's comprement: add to the above rebuits
	11101011 + 1 = 11101100
	11101011
	11101100
	1 . 1 0 1 1 0 0

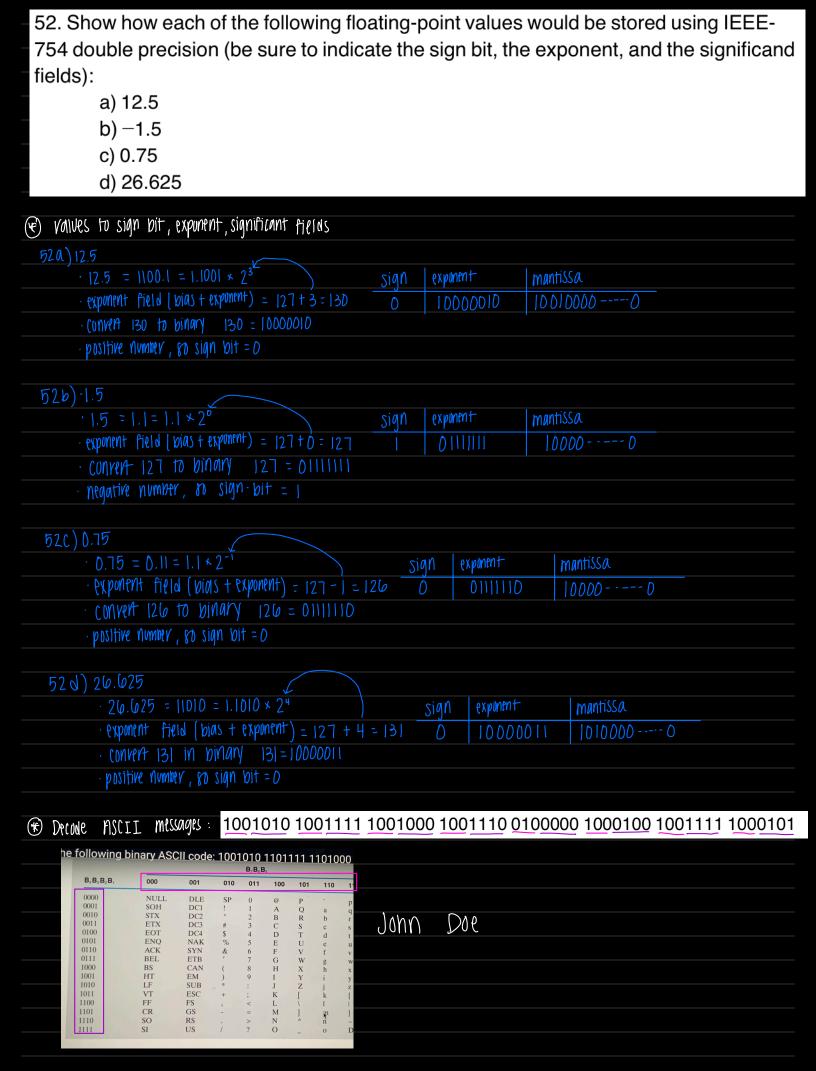
- 22. What decimal value does the 8-bit binary number 10110100 have if:
 - a) it is interpreted as an unsigned number?
 - b) it is on a computer using signed-magnitude representation? -52
 - c) it is on a computer using one's complement representation? -15
 - d) it is on a computer using two's complement representation? 76
 - e) it is on a computer using excess-127 representation? 53

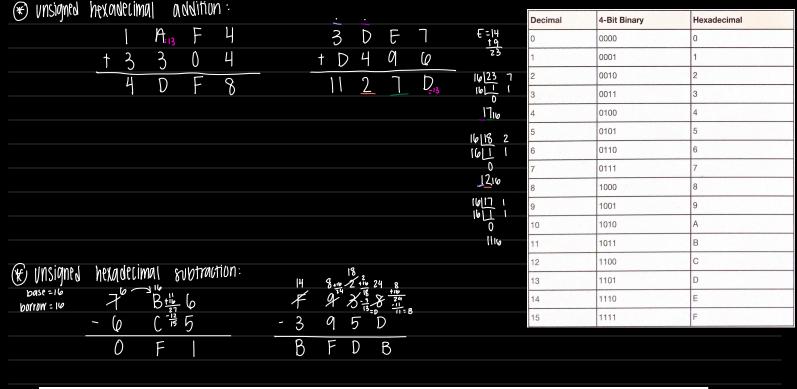
```
22 a) 10110100
     = | \times 2^7 + 0 \times 2^6 + | \times 2^5 + | \times 2^4 + 0 \times 2^3 + | \times 2^2 + 0 \times 2^4 + 0 \times 2^6
      = 2^{7} + 0 + 2^{5} + 2^{4} + 0 + 2^{2} + 0 + 0
      = 180
226) 10110100
      farmest-left bit is 1, so the number is negative
      convert the rest of the number to decimal:
        0110100
      = 0 × 2° + 1 × 25 + 1 × 24 + 0 × 23 + 1 × 22 + 0 × 2' + 0 × 2°
      = 0 + 2^5 + 2^4 + 0 + 2^2 + 0 + 0
      = 52
     80, 10110100 from signed-magnitude to decimal is -52
226) 10110100
       farmest-left bit is 1,50 the number is negative
  O flip all bits, I's to 0's, 0's to 1's, 10110100 becomes 01001011
  (2) convert yesult to necimal 1001011
                                = | x26 + 0x25 + 0x24 + | x23 + 0x22 + | x21 + | x20
                                = 2^{6} + 0 + 0 + 2^{3} + 0 + 2^{1} + 1
                                = 75
                              Answer: -75
224) 10110100
      farmest - 18ft bit is 1, so the number is negative
      O flip all bits, I's to 0's, 0's to 1's IDIIDIDD DECOMPS 01001011
       2) And I to the above result: OLODIOII + I = 1001100
                                      0 1 0 0 1 0 11
       (3) convert report to decimal
                                          1001100
                                        = | \times 2^{6} + 0 \times 2^{5} + 0 \times 2^{4} + | \times 2^{3} + | \times 2^{2} + 0 \times 2^{1} + 0 \times 2^{0}
                                        = 2^{6} + 0 + 0 + 2^{3} + 2^{2} + 0 + 0
                                        = 76
                                     Answer = -76
```

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Note: each shift to the left multiplies the number by 2
     each shift to the right divides the number by 2
```

44. Using arithmetic shifting, perform the following:

- a) double the value 000101012 A) snift 1 bit to the 18th and and 1 zero to the farthest-right: 00010101 7 001010102
- b) quadruple the value 01110111₂B) shift 2 bits to the IPFt and and 2 zero to the formest right: 01110111 -> 11011100
- c) divide the value 110010102 in half () Shift I bit to the right and presence the sign: [1100101





46. Draw the combinational circuit that directly implements the following Boolean expression:

$$F(x,y,z) = x + xy + y'z$$

