

1. FAC3

1111 1010 1100 0011

2.

F=15 A=10 C=12 3=3

$$15 \cdot 4096 + 10 \cdot 256 + 12 \cdot 16 + 3 \cdot 1$$

$$61440 + 2560 + 192 + 3 = 64195$$

3.

FAC3 = 1111 1010 1100 0011

Flip = 0000 0101 0011 1100

Add 1 = 0000 0101 0011 1101

$$1024 + 256 + 32 + 16 + 8 + 4 + 1 = -1341$$

4. 0064

0000 0000 0110 0100

5.

$$6 \cdot 16 + 4 = 100$$

6.

0064 = 0000 0000 0110 0100

Same as above: 100

7. Hex 8000

1000 0000 0000 0000

8.

$$4096 \times 8 = 32,768$$

9.

$$8000 = 1000 \ 0000 \ 0000 \ 0000$$

$$\text{Hex} = 0111111111111111$$

$$\text{Add 1} = 1000000000000000 = -32,768$$

10.

500

$$16 \overline{) 8000} \text{ R0}$$

$$-80$$

31

$$16 \overline{) 500}$$

$$-48$$

R4

20

$$-16$$

4

1

$$16 \overline{) 31}$$

$$-16$$

R15

$$15$$

$$16 \overline{) 0} \text{ R1}$$



4000  
11. 28000 Ro

2000  
21000 Ro

1000  
22000 Ro

500  
21000 Ro

250  
21500 Ro

125  
21500 Ro

62  
21500 Ri

31  
2162 Ro

15  
2131 Ri

7  
2115 Ri

3  
217 Ri

1  
213 Ri

0  
211 Ri

Binary of 8,000: 0001 1111 0100 0000

Hex: 1F40

12. 1. 11000000 10000000

Binary of 11: 0000 0000 0000 1011

Flp: 1111 1111 1111 0100

Add 1: 1111 1111 1111 0101

Hex: FFF5

13. Binary of 32,717: 0111 1111 1100 1101

232717 Ri

Flp: 1000 0000 0011 0010

215358 Ro

28179 Ri

Add 1: 1000 0000 0011 0011

24089 Ri

22044 Ro

Hex: 8033

21022 Ro

2511 Ri

2255 Ri

2127 Ri

263 Ri

231 Ri

215 Ri

27 Ri

23 Ri

21 Ri

10

14. 1011 1101

B D

0x BD



$$15. 1011110100000001$$

$$32768 + 8192 + 1096 + 2048 + 1024 + 256 + 1 = 48,385$$

$$16. 1011110100000001$$

$$\text{Exp: } 010000101111110$$

$$\text{Add 1: } 010000101111111$$

$$16,384 + 512 + 128 + 64 + 32 + 16 + 8 + 4 + 2 + 1 = 17151$$

$$-17151$$

$$17. -2^{20-1} = -2^{19} \text{ or } -524,288$$

$$18. 524,288 - 1 = 524,287$$

for 0

$$19. \begin{array}{r} 13511 \\ + 4FFC \\ \hline \end{array}$$

$$850D$$

$$20. 4FFC$$

$$8 \cdot 4096 + 5 \cdot 256 + 13 = 34061$$

No wraparound needed  
so it is still  $850D$