

17a) $01111001_2 \rightarrow$ decimal

First bit is 0, so the number is positive. Magnitude is 1111001

$$1111001_2 = 1 + 2^3 + 2^4 + 2^5 + 2^6 = 121$$

$$\mathbf{01111001_2 \rightarrow 121_{10}}$$

17b) $10000011_2 \rightarrow$ decimal

First bit is 1, so the number is negative.

$$10000011 \text{ negated} \rightarrow 01111100$$

$$01111100 + 1 = 01111101 = 1 + 2^2 + 2^3 + 2^4 + 2^5 + 2^6 = 125_{10} = \text{magnitude}$$

$$\mathbf{10000011_2 \rightarrow -125_{10}}$$

17c) $10011001_2 \rightarrow$ decimal

First bit is 1, so the number is negative.

$$10011001 \text{ negated} \rightarrow 01100110$$

$$01100110 + 1 = 01100111 = 1 + 2^1 + 2^2 + 2^5 + 2^6 = 103_{10} = \text{magnitude}$$

$$\mathbf{10011001_2 \rightarrow -103_{10}}$$

18a) F017 (16 bit two's complement hex) \rightarrow decimal

$$F017 \rightarrow \text{binary two's complement} = 1111\ 0000\ 0001\ 0111$$

First bit is 1 so the number is negative

$$1111\ 0000\ 0001\ 0111 \text{ negated} \rightarrow 0000\ 1111\ 1110\ 1000$$

$$0000\ 1111\ 1110\ 1000 + 1 = 0000\ 1111\ 1110\ 1001 = 4073_{10} = \text{magnitude}$$

$$\mathbf{F017\ (16\ bit\ two's\ complement\ hex) \rightarrow -4073_{10}}$$

18b) 20B5 (16 bit two's complement hex) \rightarrow decimal

$$20B5 \rightarrow \text{binary two's complement} = 0010\ 0000\ 1011\ 0101$$

First bit is 0 so the number is positive. Magnitude is 0010 0000 1011 0101.

$$0010\ 0000\ 1011\ 0101_2 = 8373_{10}$$

20B5 (16 bit two's complement hex) \rightarrow 8373₁₀

20a) A2 (8 bit unsigned) \rightarrow decimal

$$A2 = 1010\ 0010_2$$

$$1010\ 0010_2 = 162_{10}$$

A2 (8 bit unsigned) \rightarrow 162₁₀

20b) A2 (8 bit signed two's complement) \rightarrow decimal

$$A2 = 1010\ 0010_2$$

First bit is 1 so number is negative.

$$1010\ 0010 \text{ negated } \rightarrow 0101\ 1101$$

$$0101\ 1101 + 1 = 0101\ 1110$$

$$0101\ 1110_2 = 94_{10} = \text{magnitude}$$

A2 (8 bit signed two's complement) \rightarrow -94₁₀

20c) A2₁₆ \rightarrow binary

$$A_{16} = 10_{10} = 1010_2$$

$$2_{16} = 2_{10} = 0010_2$$

$$\mathbf{A2_{16} = 1010\ 0010_2}$$