Part 1

1) a. $0x4E = \boxed{0100\ 1110_2}$ b. $0xD7 = \boxed{1101\ 0111_2}$

   $4 = 100,\ E = 1110$ $D = 1101,\ 7 = 111$

2) a. $00110101 = 2^0 + 2^2 + 2^4 + 2^5 = 1 + 4 + 16 + 32 = \boxed{53_{10}}$

   b. $00101111 = 2^0 + 2^1 + 2^2 + 2^3 + 2^5 = 1 + 2 + 4 + 8 + 32 = \boxed{47_{10}}$

3) a. $0x7E = 7 \times 16^1 + 14 \times 16^0 = 112 + 14 = \boxed{126_{10}}$

   b. $0x5B = 5 \times 16^1 + 11 \times 16^0 = 80 + 11 = \boxed{91_{10}}$

4) a. $31 = $
   $31/2 \Rightarrow 1$ $= \boxed{000\ 11111_2}$ b.
   $15/2 \Rightarrow 1$
   $7/2 \Rightarrow 1$
   $3/2 \Rightarrow 1$
   $1/2 \Rightarrow 1$

   b. $65 = $
   $65/2 \Rightarrow 1$ $= \boxed{0100 0001_2}$
   $32/2 \Rightarrow 0$
   $16/2 \Rightarrow 0$
   $8/2 \Rightarrow 0$
   $4/2 \Rightarrow 0$
   $2/2 \Rightarrow 0$
   $1/2 \Rightarrow 1$

5) a(6). $31 = $
   $31/16 \Rightarrow F$ $= \boxed{1F_{16}}$ b(7). $65 = $ $65/16 \Rightarrow 1$ $= \boxed{41_{16}}$
   $1/16 \Rightarrow 1$ $4/16 \Rightarrow 4$

8) $200_{10} \rightarrow 11001000_2$ So, <u>8-bits</u> are required to store it.

9) $8\ bits = 1\ byte$ thus <u>1 byte</u> is required to store 200

10) a. 17̶ = 10001   -17 = $\underbrace{1001}_{9}\underbrace{0001}_{1}$ ⇒ $\boxed{91_{16}}$ Signed Magnitude
   17

   b. 35 = 100011   -35 = $\underbrace{1010}_{A}\underbrace{0011}_{3}$ ⇒ $\boxed{A3_{16}}$

11) a. 17 = 00010001   -17 = $\underbrace{1110}_{E}\underbrace{1110}_{E}$ ⇒ $\boxed{EE_{16}}$ 1's complement

   b. 35 = 00100011   -35 = $\underbrace{1101}_{D}\underbrace{1100}_{C}$ ⇒ $\boxed{DC_{16}}$

12) a. 17 = 00010001   -17 = $\underbrace{1110}_{E}\underbrace{1111}_{F}$ ⇒ $\boxed{EF_{16}}$ 2's complement

   b. 35 = 00100011   -35 = $\underbrace{1101}_{D}\underbrace{1101}_{D}$ ⇒ $\boxed{DD_{16}}$

13) a. 0x85 = $\underbrace{1000\,0101}_{5}$ ⇒ $\boxed{-5_{10}}$

   b. 0x EA = $\underbrace{1110\,1010}$ ⇒ $\boxed{-106_{10}}$ Signed Magnitude

14) a. 0x85 = 10000101   ⟶ $\boxed{-122_{10}}$ 1's complement
         01111010 = 122

   b. 0x EA = 11101010   ⟶ $\boxed{-21_{10}}$
         00010101 = 21

15) a. 0x85 = 10000101   ⟶ $\boxed{-123_{10}}$ 2's complement
         01111011 = 123

   b. 0xEA = 11101010   ⟶ $\boxed{-22_{10}}$
         00010110 = 22