

# Comp 7615 - A1

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1) A) 00110101

$$(1 \times 2^5) + (1 \times 2^4) + (1 \times 2^3) + (1 \times 2^0)$$

$$32 + 16 + 4 + 1$$

$$= 53$$

B) 10010110

$$(1 \times 2^7) + (1 \times 2^4) + (1 \times 2^3) + (1 \times 2^1)$$

$$128 + 16 + 4 + 2$$

$$= 150$$

C) 11001100

$$(1 \times 2^7) + (1 \times 2^6) + (1 \times 2^3) + (1 \times 2^2)$$

$$128 + 64 + 8 + 4$$

$$= 204$$

2) ~~10101111~~  
~~11011011~~

a) A) 1'0'0'1'1'1'1'

11011011

110001010

B) 1'0'0'1'0'1'1'1'

11111111

110010110

c) 0'0'0'0'1'1'0'1'

+ 11111001

100000110

(Applied 2's Complement)

00001101  
00000111  
00000000

00001101  
00000111  
00000110



- 3) A)  $4095 \rightarrow 4096 \rightarrow \log_2 4096 = 12 \text{ bits}$   
 B)  $65534 \rightarrow 65535 \rightarrow \log_2 65535 = 16 \text{ bits}$   
 C)  $42319 \rightarrow \log_2 42319 = 15.369 \text{ bits} \rightarrow 16 \text{ bits}$

4) A)  $\begin{array}{cccc} 0011 & 0101 & 1101 & 1010 \\ 3 & 5 & C & A \end{array}$

B)  $\begin{array}{cccc} 1100 & 1110 & 1010 & 0011 \\ 8C & DE & A & 3 \end{array}$

C)  $\begin{array}{cccc} 1111 & 1110 & 1101 & 1011 \\ F & E & D & B \end{array}$

5) A)  $\begin{array}{ccccccccc} 0 & 1 & 2 & 6 & F & 9 & D & 4 \\ 0000 & 0001 & 0010 & 0110 & 1111 & 1001 & 1101 & 0100 \end{array}$

B)  $\begin{array}{ccccccccc} 6 & A & C & D & F & A & 9 & 5 \\ 0110 & 1010 & 1100 & 1101 & 1111 & 1010 & 1001 & 0101 \end{array}$

C)  $\begin{array}{ccccccc} F & 6 & B & D & C & 2 & A \\ 1111 & 0110 & 1011 & 1101 & 1100 & 0010 & 1010 \end{array}$

128 64 32 16 8 4 2 1  
0000000000

6) A) -72

01001000 +72  
10110111 FLIP  
10111000 +1 (-72)

B) -98

~~01011~~  
01100010 +98  
10011101 FLIP  
10011110 +1 (-98)

C) -26

00011010 +26  
11100101 FLIP  
11100110 +1 (-26)

7) Letter G:

Decimal: 71

Hex: 47

Binary: 0100 0111

8) Symbol t

Decimal: 22873

Hex: 5977

Binary: 0101 1001 0010 0111

9) multiplexors use  $2^N$  inputs to connect to a single output. The selection of input is decided by  $N$  selector bits. Therefore a 4 input multiplexor has  $\log_2 4 = 2$  selector bits