ECE3221 – Quiz # 4 **May 31, 2017** **Adam Wilson**

Name: ____SOLUTIONS___ Student #: _____ Signature: _____

Calculators not allowed

1. (4 marks) Complete the table below by converting each of the supplied signed values to the type of signed value shown.

Signed Decimal Value	Sign and Magnitude (8 bit)	2's Complement (8 bit)
+31	$0001\ 1111_2$	$0001\ 1111_2$
-31	$1001\ 1111_2$	$1110\ 0001_2$
+65	$0100\ 0001_2$	$0100\ 0001_2$
-65	$1100\ 0001_2$	$1011\ 1111_2$

2. (2 marks) Convert the following values to 8-bit binary and use 8-bit binary arithmetic to perform the addition. Show the answer in both binary and decimal:

$15_{10} = 0000\ 1111_2$
$+\ -32_{10} = 1110\ 0000_2$
$-17_{10} = 1110\ 1111_2$

$127_{10} = 0111\ 1111_2$
$+\ 32_{10} = 0010\ 0000_2$
$159_{10} = 1001\ 1111_2$

3. (1 mark) Write a single line of assembly code to multiple the **signed** value stored in register r6 by 8 and store the result in register r3 using a shift instruction:

slli r3, r6, 3

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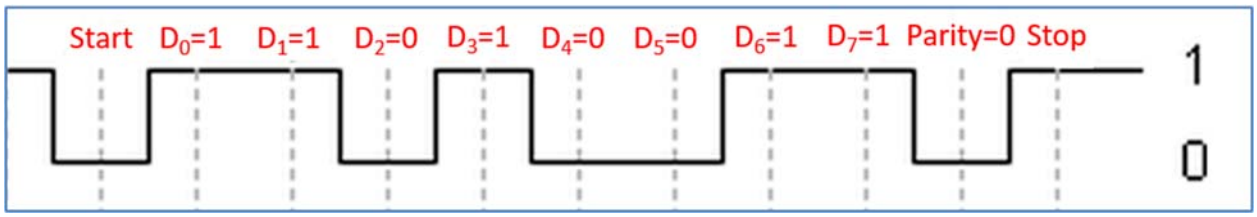

Figure 1 - Asynchronous transmission of 8 data bits

4. (2 marks) The above diagram shows the timing diagram for an asynchronous RS232 data transmission with a data size of 8 bits. What is the value of the data byte being transmitted in **hex**?

_____$1100\ 1011_2 = 0xCB_{16}$_____

5. (1 mark) What type of parity is being used in the above data transmission (assuming no errors in the data)?

_____odd parity: number of bits set (1) including parity bit is odd_____

6. (1 mark) If the duration of each bit is 10ms, what is the data rate of the above transmission in **bit/s**?

_____data rate = 1 / 0.01s = 100 bit/sec_____