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| Instructor |  | Due Date |  |

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| Part | **1** | **2** | **3** | **4** | Total |
| *Maximum Points* | **25** points | **25** points | **25** points | **25** points | **100**G101010 pointsG |
| ***Your Score*** |  |  |  |  |  |

**Textbook Reading Assignment**

Thoroughly read Chapter(s) 2 in your Computer Architecture and Organization textbook.

**Part 1 Glossary Terms - Data Representation**

Define, in detail, each of these glossary terms from the realm of computer architecture and organization, in general. If applicable, use examples to support your definitions. Consult your notes or course textbook(s) as references or the Internet by visiting Web sites such as:

[**http://www.ask.com**](http://www.askjeeves.com) or [**http://www.webopedia.com**](http://www.webopedia.com/)

**(a) ASCII**

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**(b) BCD**

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**(c) Error Detection and Correction**

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**(d) Floating - Point Number**

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**(e) Unicode**

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**Part 2 Exercises - Data Representation**

Provide a brief but complete answer for each of these exercises or find the solution of the given problem.

**(1)** Perform the following base conversions using subtraction or division – remainder.

(a) 588 10 = \_\_\_\_\_\_\_\_\_ base 3

(b) 2254 10 = \_\_\_\_\_\_\_\_\_ base 5

(c) 652 10 = \_\_\_\_\_\_\_\_\_ base 7

(d) 3104 10 = \_\_\_\_\_\_\_\_\_ base 9

**(2)** Represent the following decimal numbers in binary using 8 - bit signed magnitude, one's complement and two's complement and excess - 127 representation.

(a) 77

signed magnitude: \_\_\_\_\_\_\_\_\_\_

one's complement: \_\_\_\_\_\_\_\_\_\_

two's complement: \_\_\_\_\_\_\_\_\_\_

excess - 127: \_\_\_\_\_\_\_\_\_\_

(b) − 42

signed magnitude: \_\_\_\_\_\_\_\_\_\_

one's complement: \_\_\_\_\_\_\_\_\_\_

two's complement: \_\_\_\_\_\_\_\_\_\_

excess - 127: \_\_\_\_\_\_\_\_\_\_

(c) 119

signed magnitude: \_\_\_\_\_\_\_\_\_\_

one's complement: \_\_\_\_\_\_\_\_\_\_

two's complement: \_\_\_\_\_\_\_\_\_\_

excess - 127: \_\_\_\_\_\_\_\_\_\_

(d) − 107

signed magnitude: \_\_\_\_\_\_\_\_\_\_

one's complement: \_\_\_\_\_\_\_\_\_\_

two's complement: \_\_\_\_\_\_\_\_\_\_

excess - 127: \_\_\_\_\_\_\_\_\_\_

**Part 3 Exercises - Data Representation**

**(1)** Suppose a computer uses 4 - bit one’s complement representation. Ignoring overflows, what value will be stored in the variable j after the following pseudocode routine terminates?

( Complete the following table to show your responses. )

**0 → j // store 0 in j**

**−3 → k // store −3 in k**

**while k ≠ 0**

**j = j + 1**

**k = k − 1**

**end while**

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| --- | --- | --- | --- |
| **j** | **binary** | **k** | **binary** |
| **0** | **0000** | **− 3** | **1100** |
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| **− 3** | **1100** | **0** | **0000** |

**(2)** Assume a 24 - bit word on a computer. In these 24 bits, we wish to represent the value 295 .

(a) How would the computer represent the string 295 ?

(b) If our computer uses 8 - bit ASCII and even parity, how would the computer represent the string 295 ?

(c) If our computer uses packed BCD with zero padding, how would the computer represent the number + 295 ?

Binary Value: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

ASCII: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Packed BCD: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Part 4 Exercises - Data Representation**

**(1) ( Mayan Number Systems )**

The ancient Mayans used a base 20 number system. Research their particular number system and then answer each of these:

**(a)** Convert the base ten number 2010 into a Mayan numeral.

**(b)** Convert the Roman Numeral MCXXVII into a Mayan numeral.

**(c)** In your opinion, what were some advantages and disadvantages of the Mayan Number System.