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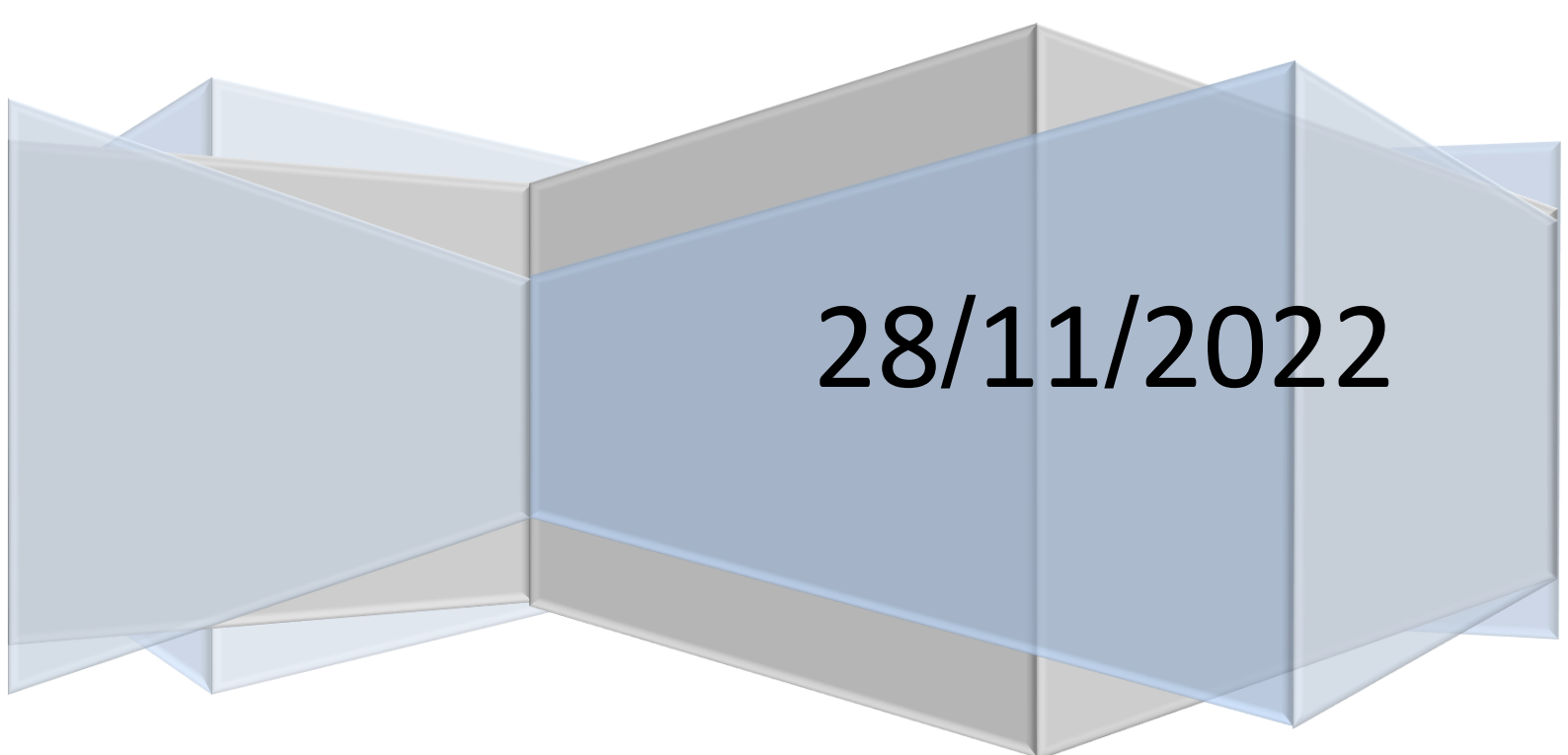
The Answer to the first Assignment

COMP 1310

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Question 1:

A) Classify the following into Input, Output, Processing, and Storage device Mouse, Printer, CPU, Touch screen, RAM, Scanner, Flash Memory, Sensor?

❖ **Answer:**

Device/ classifying	Input	Output	Processing	Storage
Mouse	✓			
Printer		✓		
CPU			✓	
Touch screen	✓	✓		
RAM				✓
Scanner	✓			
Flash Memory				✓
Sensor	✓			

B) Differentiate between the following:

1) Primary storage vs Secondary storage ?

❖ **primary storage:**

1. the central computer system storage.

2. fast and expensive.

3. Can not be dispensable.

❖ **Secondary storage:**

1. is the computer system's external storage.

2. slower but cheaper.

3. Can be dispensable

2) Cache vs Registers?

- Register: is the smallest holding data element that is built into the processor itself. These are memory locations that can be directly accessible by the processor. It holds a small amount of data around 32-bits to 64-bits and may hold an instruction, a storage address, or any kind of data such as a bit sequence or individual characters.

-Cache Memory: The cache is a smaller and fast memory component in the computer which is inserted between the CPU and the main memory. To make this arrangement effective. The cache needs to be much faster than the main memory. This approach is more economical than the use of fast memory devices to implement the entire main memory.

3) RAM vs ROM?

-RAM: Random Access Memory

2. Volatile

3. Temporary storage

4. Read and Write

5. Allows the computer to read data quickly to run applications.

- ROM: Read only memory

2. Non-volatile

3. Permanent storage

4. Read only

5. Stores the program required to initially boot the computer.

Question 2: Using 8-bit pattern and two's complement, find the answers (Show the solution steps)?

A) $(35)_{16}$ - $(36)_7$ = (26)$_{10}$

❖ **Answer:**

1). $(35)_{16}$ = (**53**)$_{10}$ = (**00110101**)$_2$

= $3 \times 16^1 + 5 \times 16^0 = 3 \times 16 + 5 \times 1 = 48 + 5 = (53)_{10}$

2	53	R
2	26	1
2	13	0
2	6	1
2	3	0
2	1	1
	0	1

$(53)_{10} = (00110101)_2$

2). $(36)_7$ = (**27**)$_{10}$ = (**00011011**)$_2$:

$3 \times 7^1 + 6 \times 7^0 = 3 \times 7 + 6 \times 1 = 21 + 6 = (27)_{10}$

2	27	R
2	13	1
2	6	1
2	3	0
2	1	1
	0	1

$(27)_{10} = (00011011)_2$

$(-27)_{10}$ = (**11100101**)$_2$

We need use two's complement :

1$^{\text{rs}}$ comp: Convert 1 to 0 and vice versa:

= $(00011011)_2$= (**11100100**)$_2$

2$^{\text{rs}}$ comp: Add 1 to the binary number:

$(53)_{10}$ + $(-27)_{10}$ = (   )$_{10}$

$(00110101)_2$ + $(11100101)_2$ = (00011010)$_2$

```
    00110101
    11100101+
   _____
    00011010
```

```
    11100100
         +1
   _____
    11100101
```

(**00011010**)$_2$ = (**26**)$_{10}$

$2^4 + 2^3 + 2^1 = 16 + 8 + 2 = (26)_{10}$.

B) $(132)_8 - (58)_{16} = (\textcolor{red}{2})_9 = (\textcolor{red}{2})_4$

❖ **Answer:**

1). $(132)_8 = (\textcolor{red}{90})_{10} = (\textcolor{red}{01011010})_2$

$= 1 \times 8^2 + 3 \times 8^1 + 2 \times 8^0 = 64 + 24 + 2 = (90)_{10}$

2	90	R
2	45	0
2	22	1
2	11	0
2	5	1
2	2	1
2	1	0
	0	1

$(90)_{10} = (01011010)_2$

2). $(58)_{16} = (\textcolor{red}{88})_{10} = (\textcolor{red}{01011000})_2$:

$3 \times 7^1 + 6 \times 7^0 = 3 \times 7 + 6 \times 1 = 21 + 6 = (27)_{10}$

2	88	R
2	44	0
2	22	0
2	11	0
2	5	1
2	2	1
2	1	0
	0	1

$(88)_{10} = (01011000)_2$

$(-88)_{10} = (\textcolor{red}{10101000})_2$

We need use two's complement :

$(-88)_{10} = (\textcolor{red}{10101000})_2$

$(90)_{10} + (-88)_{10} = (\qquad)_{10}$

$(01011010)_2 + (10101000)_2 = (\textcolor{red}{00000010})_2$

$1'^s$ comp: **Convert 1 to 0 and vice versa:**

$= (01011000)_2 = (\textcolor{red}{10100111})_2$

```
  01011010
  10101000+
  00000010
```

$2'^s$ comp: **Add 1 to the binary number:**

```
  10100111
       +1
  10101000
```

$(00000010)_2 = (\textcolor{red}{2})_{10}$

$(2)_{10} = 2 \times 9^0 = (2)_9$

$(2)_{10} = 2 \times 4^0 = (2)_4$

Question 3: Use the 32-bit floating point representation to represent the following numbers in memory.

A. $(- 27.875)_{10}$

❖ **Answer:**

$(27)_{10} = (\textcolor{red}{110101})_2$, $(0.875)_{10} = (\textcolor{red}{0.11100000})_2$

2	27	R
2	13	1
2	6	1
2	3	0
2	1	1
	0	1

$(27.875)_{10} = (11011.11100000)_2$

$1.101111100000 \times 2^4 = 4 + 127 = (131)_{10}$

$(131)_{10} = (\textbf{\textcolor{red}{10000011}})_2$

2	131	R
2	65	1
2	32	1
2	16	0
2	8	0
2	4	0
2	2	0
2	1	0
	0	1

Delete the 1 to the left of the dot

$(27.875)_{10} = ($101111100000$)_2$

1	**10000011**	101111100000000000000000

12   1   13   15   0   0   0   0

B. $(13.4)_8$

❖ **Answer:**

1). $(13.4)_8 = (\textbf{\textcolor{red}{11.5}})_{10}$

$1 \times 8^1 + 3 \times 8^0 + 4 \times 8^{-1} = 8 + 3 + 0.5 = (11.5)_{10}$

$(11)_{10} = (\textbf{\textcolor{red}{1011}})_2$, $(0.5)_{10} = (\textbf{\textcolor{red}{0.1}})_2$

2	11	R
2	5	1
2	2	1
2	1	0
	0	1

$(11.5)_{10} = (1011.1)_2$

$1.0111 \times 2^3 = 3 + 127 = (130)_{10}$

$(130)_{10} = (\textbf{\textcolor{red}{10000010}})_2$

$(27)_{10} = (00011011)_2$

$(0.875)_{10} = (0.11100000)_2$

2	0.875	I.P
2	0.750	1
2	0.5	1
	0	1

$(11)_{10} = (1011)_2$

$(0.5)_{10} = (0.1)_2$

2	0.5	I.P
2	0	1

00
00
DF
C1

2	130	R
2	65	0
2	32	1
2	16	0
2	8	0
2	4	0
2	2	0
2	1	0
	0	1

Delete the 1 to the left of the dot

$(11.5)_{10}$ = $(0111)_2$

0	**10000010**	01110000000000000000000

4   1   3   8   0   0   0   0

00
00
38
41

Question 4:

A) **The value below represents a float value in the computer memory using 32-bit floating point representation. Find out the decimal value for this representation. (Show the solution steps).**

00
00
91
C1

Low order byte (top)

High order byte

❖ **Answer:**

$(C1)_{16}$ = (**193**)$_{10}$

= $12 \times 16^1 + 1 \times 16^0$ = 192 + 1 = $(193)_{10}$

$(193)_{10}$ = **$(11000001)_2$**

2	193	R
2	96	1
2	48	0
2	24	0
2	12	0
2	6	0
2	3	0
2	1	1
	0	1

$(91)_{10}$ = (**01011011**)$_2$

2	91	R
2	45	1
2	22	1
2	11	0
2	5	1
2	2	1
2	1	0
	0	1

$(00)_{10}$ = $(0000)_2$

$(00)_{10}$ = $(0000)_2$

1	10000010	10110110000000000000000

C 1 9 1 0 0 0 0

↙

$2^7 + 2^1 = 128 + 2 = \textbf{130}$ --------------> $130 - 127 = \textbf{3}$

0.1011011×2^3 --------------> $(1101.1011)_2$

$(00001101)_2 = 2^3 + 2^2 + 2^0 = 8 + 4 + 1 = \textbf{(13)}_{10}$

$(0.10110000)_2 = 2^{-4} + 2^{-3} + 2^{-1} = 0.0625 + 0.125 + 0.5 = \textbf{(0.6875)}_{10}$

$(1101.1011)_2 = \textbf{(-13.6875).}$

B) 1- Represent the following two integers (2 bytes each using 2's complement) in computer memory (Hex representation): 34, -21,

❖ **Answer:**

1). $34 : (100010)_2 = (000000000100010)_2$

0   0   2   2

	22
	00

2	34	R
2	17	0
2	8	1
2	4	0
2	2	0
2	1	0
	0	1

2). $-21 : (21)_2 = (10101)_2 = (000000000010101)_2$

use two's comp:

$1'^s$ comp : $(1111111111101010)_2$

$2'^s$ comp: $(1111111111101011)_2$

F   F   E   B

EB
FF

2	21	R
2	10	1
2	5	0
2	2	1
2	1	0
	0	1

2- Represent the following word in memory (8-bit ASCII chars using even parity) : Cat

❖ **Answer:**

$C (67)_{10} : (01000011)_2$ ⟶ 43

$a (97)_{10} : (01100001)_2$ ⟶ 61

$t (116)_{10} : (01110100)_2$ ⟶ 74

2	116	R
2	58	0
2	29	0
2	14	1
2	7	0
2	3	1
2	1	1
	0	1

2	97	R
2	48	1
2	24	0
2	12	0
2	6	0
2	3	0
2	1	1
	0	1

2	67	R
2	33	1
2	16	1
2	8	0
2	4	0
2	2	0
2	1	0
	0	1

=
43
61
74