EXAM 1 of EET 340
Introduction to Computer Organization and Architecture

Name:

1.(10 Points) What are the five components of a computer? Give at least two examples for each component. (You do not need to discuss the components)

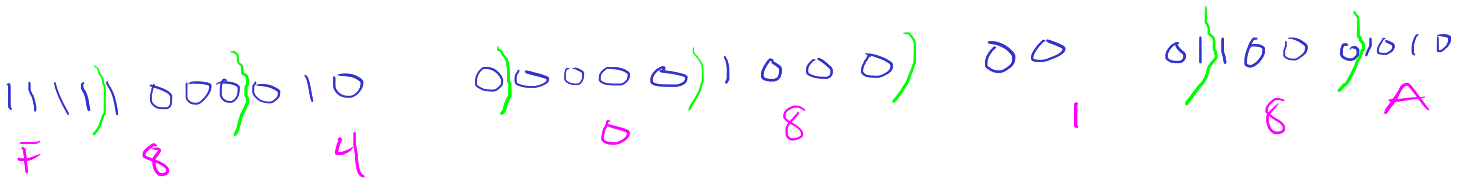
- Input (mouse, keyboard)
- Output (Display, Speakers)
- memory (flash storage, DRAM)
- Control (CPU, GPU)
- Datapath (ALU, Instruction register)

2. (15 Points) Convert Decimal value to binary and then convert to hexadecimal value (Show the steps of calculation): 21_{10}

$21_{10} = 10101_2 = 15_{16}$

16 8 4 2 1
1 0 1 0 1
(1 5)$_{16}$

3. (20 Points) Convert following assembly instruction to 32 bit machine code and then change it to Hexadecimal format. LDUR X10, [X12, #8]
NB: Opcode for LDUR is 1986, which is 11111000010 in 11 bit binary.



0xF84081 8A

4. (10 Points) Provide definition of the followings:
a. Assembly language b. Machine Code c. Amdahl's law

a. understood by computer, but not clear to human writing it or reading it.

b. Programs written in binary

c. P = 1/Execution Time

5. (20 Points) Convert C++ code snippet to LEGv8 assembly code. The following variables a, b, and c are associated with the registers X19, X20, and X21, respectively. The base address of array d is in X22. Comment the code.

```
for (i=1; i<=a; i++)
{
  d[b] = i + c;
}
```

```
ADDI X9, XZR, #1
loop: CMP X9, X19
B.LT exit
LSL X10, X9, #3
LDUR X10, [X22, X20]
ADD X10, X9, X21
B loop
exit:
```

6. (25 Points) Consider three different processors P1, P2, and P3 executing the same instruction set. If the processors each execute a program in 10 seconds, find the number of cycles and the number of instructions (each processor)?

	P1	P2	P3
Clock Rate	3.5 GHZ	3 GHZ	4.5 GHZ
CPI	1.5	1	2.5

I do not understand how to complete this question