CEN 305 Computer Architecture Hw2

Question 1. (20 points) Fill in the blanks

- …………………………. is the interface between hardware and software.

- ………………………… instruction is used to load upper immediate part of an immediate to a register.

- ……………………………. is a component in CPU responsible for arithmetic operation.

- ………………………… register stores the current execution step of a program.

- ……………………….. instruction is used to unconditially jump to a location.

Question 2. (20 points) Convert the below given C program to MIPS program <u>as much as possible.</u>

```
// This program asks user a number, then prints the sum of [1,n] interval.
#include<stdio.h>
void main()
{
    int n=0,counter=0,sum=0;
    printf("Enter the number:");
    scanf("%d",&n);
    while(counter<=n)
    {
      sum=sum+i;
      counter++;
    }
   printf("The sum of number from 1 to %d is:%d \n",counter,sum);
}
```

Question 3. (20 points) Convert the below given C program to MIPS program <u>as much as possible.</u>

```
// This program asks user a base and a power, then prints the power of base value.
#include<stdio.h>
int findPower(int base,int power)
{
    int counter=power;
    int result=1;
    while(counter>0)
    {
        result=result*power;
        counter--;
    }
    return result;
}
void print(int number)
{
    printf("The number is:%d \n",number);
}
void process(int base,int power)
{
    int result=findPower(base,power);
    print(result);
}
void main()
{
    process(5,7);
}
```

Question 4. (20 points) Write a MIPS program with comments that will first copy the square of each original element of array1 to array2 and the cube of each original element of array2 to array1.

    Example
    array1 : .word 3,1,6,4,9,8
    array2 : .word 1,3,4,5,10,3

    After execution :
    array2 has 9,1,36,16,81,64
    array1 has 1,27,64,125,1000,27 and this is displayed.

Question 5. (20 points) Please convert the MIPS program to C program as much as possible.

```
        .data
array:  .word  -29, -30, 75, 34, -2, 90, -11, 98, 1, 0, 76
        .text
main:
        la     $a1,array           # $a1 = &array
        li     $a0, 0       # $a0 = 0
loop:
        lw     $t0,0($a1)    # $t0 = Mem($a1)
        beqz   $t0, done
        addi   $a1, $a1, 4   # $a1 = $a1 + 4
        andi   $t3, $t0, 1   # $t3 = LSB of $t0
        bnez   $t3, odd      # branch if odd
        bltz   $t0, loop
        add    $a0, $a0, $t0  # $t2 = $t2 + $t0
        b      loop
odd:
        bgtz   $t0, loop
        sub    $a0, $a0, $t0  # $a0 = $a0 - $t0
        b      loop
done:
        li     $v0,   1       # Print result syscall(1)
        syscall
        li     $v0,   10      # exit
        syscall
```

Question 6. (20 points) A MIPS code is given below.

```
add $4,$3,$2
sub $5,$6,$7
lw $6,$4,5($4)
sw $2,$1,5($4)
or $5,$6,$7
```

Write the values of the control signals for each cycle for single cycle MIPS processor.

Cycle number	MemRead	MemWrite	RegDst	MemToReg	RegWrite	ALUSrc	AluOp
1							
2							
3							
4							
5							

Deadline: 8. August. 2012, 23.59

Submission: Please submit your homework to the Online Course System. Other submissions will **NOT** be graded. Please contact Esra Ruzgar for further questions.

Homework Policies:

1. Cheating is strongly discouraged.
2. Late homeworks will be graded as 0.
3. Please comment your source codes.

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