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Homework #1-3

Problem 1

2.8 Translate the following RISC-V code to C. Assume that the variables f, g, h, i, and j are assigned to registers x5, x6, x7, x28, and x29, respectively. Assume that the base address of the arrays A and B are in registers x10 and x11, respectively.

```
addi x30, x10, 8      // x30 = &A[1]
addi x31, x10, 0      // x31 =
sd x31, 0(x30)        // x31 = &A
ld x30, 0(x30)        // x30 = &A
add x5,x30, x31       // f= 2*(&A)
```

f = 2*(&A)

Problem 2

2.10 Assume that registers x5 and x6 hold the values 0x8000000000000000 and 0xD000000000000000, respectively.

2.10.1 What is the value of x30 for the following assembly code?

```
add x30, x5, x6
```

x30 = x5 + x6
= 0x 5000 0000 0000 0000
= 0x 5000 0000 0000 0000

1000 + 1101
= 0101

2.10.2 Is the result in x30 the desired result, or has there been overflow?

Overflow

2.10.3 For the contents of registers x5 and x6 as specified above, what is the value of x30 for the following assembly code?

```
sub x30, x5, x6
```

x30 = x5 - x6
= 0x B000 0000 0000 0000

8 - D = -5 (0101)
+ 1010
= 1011

2.10.4 Is the result in x30 the desired result, or has there been overflow?

No Overflow

2.10.5 For the contents of registers x5 and x6 as specified above, what is the value of x30 for the following assembly code?

```
add x30, x5, x6
add x30, x30, x5
```

x30 = x5 + x6
= 0x 5000 0000 0000 0000
x30 = x30 + x5
= 0x D000 0000 0000 0000

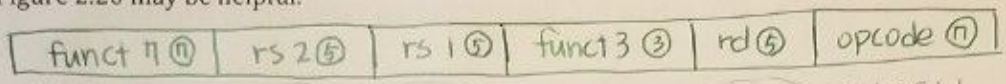
1 5000

2.10.6 Is the result in x30 the desired result, or has there been overflow?

Overflow

Problem 3

2.12 Provide the instruction type and assembly language instruction for the following binary value:
0000 0000 0001 0000 1000 0000 1011 0011$_{two}$
Hint: Figure 2.20 may be helpful.



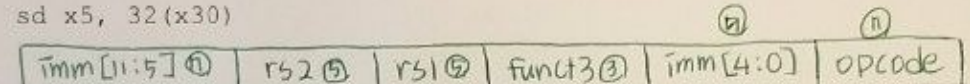
: R-type : add x1, x1, x1

Problem 4

2.13 Provide the instruction type and hexadecimal representation of the following instruction:

sd x5, 32(x30)

immediate 32
rs2 = 5
rs1 = 30
opcode = 35
funct3 = 3

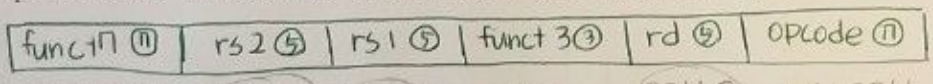


: S-type : 0x025F3023

Problem 5

2.14 Provide the instruction type, assembly language instruction, and binary representation of instruction described by the following RISC-V fields:

opcode=0x33, funct3=0x0, funct7=0x20, rs2=5, rs1=7, rd=6

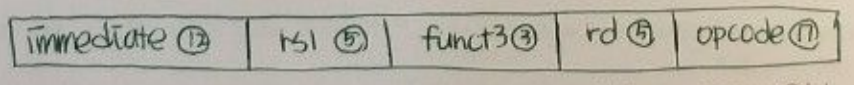


: R-type : sub x6, x7, x5

Problem 6

2.15 Provide the instruction type, assembly language instruction, and binary representation of instruction described by the following RISC-V fields:

opcode=0x3, funct3=0x3, rs1=27, rd=3, imm=0x4



: I-type : ld x3, 4(x27)