Computer Architecture   Due: Jan 25, 2018   Spring 2018

Homework #1-2

Problem 1

2.1 For the following C statement, write the corresponding RISC-V assembly code. Assume that the C variables f, g, and h, have already been placed in registers x5, x6, and x7 respectively. Use a minimal number of RISC-V assembly instructions.

```
f = g + (h - 5);
x5   x6    x7
```

Subi x18, x7, #5
add x5, x6, x18

Problem 2

2.2 Write a single C statement that corresponds to the two RISC-V assembly instructions below.

```
add f, g, h    →  f = g+h
add f, i, f
```
→ f = i+f
= i + (g+h) = i+g+h

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Problem 3

2.4 For the RISC-V assembly instructions below, what is the corresponding C statement? 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.

```
slli x30, x5, 3    // x30 = f*8
add x30, x10, x30  // x30 = &A[f]
slli x31, x6, 3    // x31 = g*8
add x31, x11, x31  // x31 = &B[g]
ld x5, 0(x30)      // f = A[f]
addi x12, x30, 8
ld x30, 0(x12)
add x30, x30, x5
sd x30, 0(x31)
```

$f = x5$
$g = x6$
$h = x7$
$i = x28$
$j = x29$

$A = x10$
$B = x11$

$$B[g] = A[f] + A[f+1]$$

Problem 4

2.5 Show how the value 0xabcdef12 would be arranged in memory of a little-endian and a big-endian machine. Assume the data are stored starting at address 0 and that the word size is 4 bytes.

Little Endian	Data	ab	cd	ef	12
	Address	12	8	4	0
Big Endian	Data	12	ef	cd	ab
	Address	12	8	4	0

Problem 5

2.6 Translate 0xabcdef12 into decimal.

= 0b 1010 1011 1100 1101 1110 1111 0001 0010

= 2882400018