Chapter 4 Homework

Charles Oroko

8 November 2018

Problem 4.1. If $r0$ initially contains 1, what will it contain after the third instruction in the sequence below?

```
add     r0, r0, #1          %r0=2
mov     r1, r0              %r1=2
add     r0, r1, r0 lsl #1   %r0=6
```

$r0 = 6$

Problem 4.2. What will r0 and r1 contain after each of the following instructions? Give your answers in base 10.

```
mov     r0, #1      %r0=1
mov     r1, #0x20   %r1=32
orr     r1, r1, r0  %r1=33
lsl     r1, #0x2    %r1=132
orr     r1, r1, r0  %r1=133
eor     r0, r0, r1  %r0=132
lsr     r1, r0, #3  %r1=1056
```

$r0 = 132$
$r1 = 1056$

Problem 4.3. What is the difference between *lsr* and *asr*?

The *lsr* and *asr* operations do similar things. They both shifts each bit n bits to the right, losing the least significant n bits.

With the *lsr* operation, zero is shifted into the n most significant bits. However, with the *asr* operation, the n most significant bits become copies of the sign bit (bit 31).

Problem 4.4. Write the ARM assembly code to load the numbers stored in $num1$ and $num2$, add them together, and store the result in $numsum$. Use only $r0$ and $r1$.

```
ldr     r0, =num1
ldr     r1, =num2
ldr     r0, [r0]
ldr     r1, [r1]
add     r0, r0, r1

ldr     r1, =numsum
str     r0, [r1]
```

Problem 4.2. What will r0 and r1 contain after each of the following instructions? Give your answers in base 10.

```
mov     r0, #1      %r0=1
mov     r1, #0x20   %r1=32
orr     r1, r1, r0  %r1=33
lsl     r1, #0x2    %r1=132
orr     r1, r1, r0  %r1=133
eor     r0, r0, r1  %r0=132
lsr     r1, r0, #3  %r1=1056
```

Solution

$$r0 = 132$$
$$r1 = 1056$$

Problem 4.2. What will r0 and r1 contain after each of the following instructions? Give your answers in base 10.

```
mov     r0, #1      %r0=1
mov     r1, #0x20   %r1=32
orr     r1, r1, r0  %r1=33
lsl     r1, #0x2    %r1=132
orr     r1, r1, r0  %r1=133
eor     r0, r0, r1  %r0=132
lsr     r1, r0, #3  %r1=1056
```

Solution

$$r0 = 132$$
$$r1 = 1056$$