

Homework 3

1. Consider the assembly code below. What are the hexadecimal values of registers r0 through r7 after the code has been executed? (You need only record the bottom byte.)

```
1  movw  r0, #0x35
2  movw  r1, #0x18
3  ORR   r2, r0, r1
4  BIC   r3, r0, r1
5  EOR   r4, r0, r1
6  movw  r1,  #0xF0
7  ORR   r5, r0, r1
8  BIC   r6, r0, r1
9  EOR   r7, r0, r1
```

2. Consider the assembly code below.

(a) For the 6 instructions in lines 4 through 9, indicate to the right of each instruction what the values of the N and Z of bits the PSR will be after the instruction is executed.

(b) What are the hexadecimal values of registers r0 through r2 after the code has been executed? (You need only record the bottom byte.)

```
1  movw  r0, #0x35
2  movw  r1, #0x24
3  movw  r2, #0xF0
4  TST   r0,  r1
5  TST   r0,  r2
6  TEQ   r0,  r1
7  TEQ   r0,  r2
8  ANDS  r0,  r2
9  ANDS  r1,  r2
```

3. Consider the assembly code below. What are the hexadecimal values of registers r3 through r6 after the code has been executed? (You need only record the bottom byte.)

```
1      movw  r0, #0x18
2      movw  r1, #0xF0
3      ANDS r2, r0, r1
4      MOV  r3, #0
5      BEQ  foo
6      EOR  r3, #1
7      foo:
8      MOV  r4, #0
9      ANDS r2, r0, #7
10     BEQ  bar
11     EOR  r4, #1
12     bar:
13     SUBS r2, r0, r1
14     MOV  r5, #0
15     BMI  gak
16     MOV  r5, #1
17     gak:
18     MOV  r6, #0
19     SUBS r2, r1, r0
20     BMI  argh
21     ADD  r6, #1
22     argh:
23     MOV  r2, #0
24     BNE  blat
25     EOR  r2, #1
26     blat:
```

4. Suppose we wish to configure the GPIO1 port so that PI.28 is configured as an input pin and PIO1.29 is configured as an output pin. Write the assembly language code that will properly configure the two bits without changing the direction of the other bits in GPIO1. Your code should use just one STR instruction.

5. When writing assembly code for the Cortex-M, why might we prefer to use the low registers (r0 through r7) rather than the high registers (r8 through r15)? (Other than because some of the high registers have a special function.)

6. What is the machine code for the following instruction? How many bits is it?

```
str    r5, [r11, #0x04]
```