

CSCI 255 – Intro to Embedded Systems
Homework #7
Fall 2013

Work must be done individually

Due: **10/16/2013** by **beginning of class**

For the following questions, code your answers on CCS and printout your code to hand it in. You may want to try some of these on your board to check answers. You may borrow LED bars

1 – Translate the following C-code to its MSP430 assembly code equivalent

```
#include<msp430.h>

int main(void) {

    P1DIR = 0xFF;
    int r4, r5, r6;

    r6 = 0xD3;
    r5 = 0x05;
    r4 = 0x01;

    while(1) {
        if(r4 == 1) {
            r5 = r6 ^ 0xF3; //xor
            r6 = r6 - 3;
            r4--;
        }
        else {
            r5 = r4 & r6; //and
        }
        P1OUT = r5;
    }
    return 0;
}
```

2 – If you had LEDs connected to Port 1, what are the values shown by the LEDs from the code in problem 1?

3 – Translate the following C-code to its MSP430 assembly code equivalent

```
#include<msp430.h>

int main(void) {

    P1DIR = 0xFF;
    int r4, r5, r6;
    r6 = 0xD3;
    r5 = 0x01;

    while(1) {
        P1OUT = r6;
        r6 = r6 ^ 0xFF;
        for(r4 = 36000; r4 >= 0; r4--){
            ;
        }
        for(r4 = 36000; r4 >= 0; r4--){
            r5++;
        }
        P1OUT = r5;
        for(r4 = 36000; r4 >= 0; r4--){
            ;
        }
        r5 = 0x01;
    }
    return 0;
}
```

4 – If you had LEDs connected to Port 1, what are the values shown by the LEDs from the code in problem 3?

5 – Translate the following C-code to its MSP430 assembly code equivalent

```
#include<msp430.h>

void delay(void) {
    int r14,r15;
    for(r14 = 15, r14 > 0; r14--> {
        ;
        for(r15 = 9000; r15 > 0; r15--> {
            ;
        }
    }
}

int main(void) {
    P1DIR = 0xFF;
    int r5, r6;
    r6 = 0xA7;
    r5 = 0xBB;

    while(1) {
        P1OUT = r6;
        delay();
        P1OUT = r5 & r6;
        delay();
    }
    return 0;
}
```

6 – If you had LEDs connected to Port 1, what are the values shown by the LEDs from the code in problem 5?

7 – Translate the following C-code to its MSP430 assembly code equivalent

```
#include<msp430.h>

void delay(void) {
    int r14,r15;
    for(r14 = 15, r14 > 0; r14--){
        ;
        for(r15 = 9000; r15 > 0; r15--){
            ;
        }
    }
}

void led_on(void) {
    P1OUT = 0x41;
    delay();
}

void led_off(void) {
    P1OUT = 0x00;
    delay();
}

int main(void) {

    P1DIR = 0xFF;
    int r5, r6;
    r6 = 0xA7;
    r5 = 0xFF;
    while(1) {
        r5 = r5 - 1;
        if(r5 == r6) {
            led_on();
            r5 = 0xFF;
        }
        else {
            led_off();
        }
    }
    return 0; }

```

8 – If you had LEDs connected to Port 1, what are the values shown by the LEDs from the code in problem 7?