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EE 2361- Lab 2a

1. Assembly code:

```
    mov      #0x9fff,w0
    mov      w0,AD1PCFG              ; Set all pins to digital mode
    mov      #0b1111111111111110,w0
    mov      w0,TRISA            ; set pin RA0 to output
    mov      #0x0001,w0
    mov      w0,LATA             ; set pin RA0 high
    call foreverLoop

wait_24cycles:      ; 2 cycles for function call
    repeat #14      ; 1 cycle to load and prep
    nop             ; 14+1 cycles to execute NOP 15 times
    return          ; 3 cycles for the return

; (100*10^-6)/(62.5*10^-9)
delay_100us:
    repeat #1593
    nop
    return

; 5 high and 15 low
write_0:        ; 2 (low)
    inc      LATA  ; 1 (high?)
    repeat #2      ; 1
    nop            ; 2+1 = 3
    clr      LATA  ; 1 (low)
    repeat #7      ; 1
    nop            ; 7+1 = 8
    return         ; 3

; 11 high, 9 low
write_1:        ; 2 (low)
    inc      LATA  ; 1 (high)
    repeat #8      ; 1
    nop            ; 8+1 = 9
    clr      LATA  ; 1
    ;repeat #1     ; 1
    nop            ; 1+1 = 2
    return         ; 3


foreverLoop:
```

```
    ; F5 Blue = 1111
    call delay_100us
    call write_1
    call write_1
    call write_1
    call write_1
    call write_0
    call write_1
    call write_0
    call write_1

    ; 05 Green
    call write_0
    call write_0
    call write_0
    call write_0
    call write_0
    call write_1
    call write_0
    call write_1

    ; F5 Red
    call write_1
    call write_1
    call write_1
    call write_1
    call write_0
    call write_1
    call write_0
    call write_1

    bra foreverLoop
.end
```

2. Delay calculations

of cycles = total time / time for 1 cycle

write_0:   0.35 us / 62.5 ns = 5.6 ≈ **6 cycles HIGH**
              1.25 us-0.35us = 0.9 → 0.9us / 62.5 ns = 14.4 ≈ **14 cycles LOW**

write_1:   0.7 us / 65.2 ns = 11.2 ≈ **11 cycles HIGH**
              1.25 us-0.7 us = 0.55 → 0.55 us / 62.5 ns = 8.8 ≈ **9 cycles LOW**

3. Bugs

The main bug I had related to an error in the iLED's data sheet. According to the data sheet, the 24-bit data sends in the order GRB, when it should actually be RGB. In my program, I had to rearrange the order of hard-coded write_1's and write_0's in order to get the color pink.

4. Test Patterns

I used the hexadecimal values given in lab: F5 05 F5. Then I translated it to binary: 11110101 00000101 11110101, with 0's correspond to to calls to write_0, and the 1's correspond to write_1.