

EE 2310 Homework #6 – Using Branch Instructions: Loops

Name: _____

Write the following programs as directed or answer questions about the programs below that are given.

1. In the box at right, compose a loop program to store the value 0xffff in data locations w, x, y, z (the program can be written without a loop, but you must use a loop in this problem). Then answer these questions:

1.1. What are the memory addresses of w, x, y, z?

1.2. How do you decide when you are done?

2. In the program segment at the right:

2.1. What is the program doing?

2.2. What is being put in \$t2, and what will the final value be?

3. In the area to the right, construct a program that will print out the datawords in memory in the reverse order that they are declared in the data statement. To do this, use the stack to reverse the data sequence.

```
.text
main:

.data
w:    .word 0
x:    .word 0
y:    .word 0
z:    .word 0
```

```
.text
main: li $t1, 0x77
      li $t2, 0
      la $t8, str
go:   lb $t0, ($t8)
      beq $t0, $t1, done
      addi $t8, $t8, 1
      addi $t2, $t2, 1
      j go
done: li $v0, 10
      syscall

.data
str:  .asciiz "hello world\n"
```

```
.data
nums: .word 4,3,2,1

.text
main:

      li $v0, 10
      syscall
```

4. The code sequence on the right is a loop that performs an analysis. Answer the following questions:

4.1. What is the program doing?

4.2. How many times does the program go through the loop?

4.3. What does the program print out?

```
.text
main:  li $t1,8
       la $t5,w
go:    lb $t0,0($t5)
       blt $t0,0x30,prt
       bgt $t0,0x39,prt
       j next
prt:   move $a0,$t0
       li $v0,11
       syscall

next:  sub $t1,$t1,1
       beqz $t1,end
       addi $t5,$t5,1
       j go
end:   li $a0,0x0a
       li $v0,11
       syscall
       li $v0,10
       syscall

.data
w:     .word 0x55543044
x:     .word 0x45374353
```

5. A simple, non-recursive program can be developed to compute $n!$ for any number n less than 12 (due to the fact that we are not using floating-point computations). Write such a program using the data declarations given to the right and make sure that it operates properly.

5.1. What is the decimal value of $(10!)$?

```
.text
main:

.data
input: .asciiz "Input integer (0-11): "
ans:   .ascii " factorial is "
```