

FIT1008 Introduction to Computer Science (FIT2085 for Engineers)

Tutorial 3 Semester 1, 2019

Objectives of this tutorial

- To understand how to implement decisions and loops in MIPS.
- To understand how to implement arrays in MIPS.

Exercise 1 *

Consider the following piece of (glaringly uncommented and obscure due to bad label names) MIPS code:

```
1      . data
2 a:    .space 4
3 b:    .space 4
4
5      . text
6      addi $v0, $0, 5
7      syscall
8      sw $v0, a
9
10     addi $v0, $0, 5
11     syscall
12     sw $v0, b
13
14     lw $t0, a
15     lw $t1, b
16     slt $t0, $t1, $t0
17     beq $t0, $0, one
18
19     sw $t0, $a0
20     j two
21
22 one: sw $t1, $a0
23
24 two: addi $v0, $0, 1
25     syscall
26
27     addi $v0, $0, 10
28     syscall
```

1. Comment the code and give the labels meaningful names.
2. What does this MIPS code do?

Exercise 2 *

Consider the following (also glaringly uncommented) Python code:

```
1 n = int(input("Enter integer: "))
2
3 while n > 1:
4     print(n)
5     if n % 2 == 0:
6         n = n//2
7     else:
8         n = 3*n + 1
9 print(n)
```

1. What does this Python code do?

2. Translate the above program into MIPS, making sure your translation is faithful and you use meaningful label names.
3. Load it in MARS (the MIPS simulator, not the quiz) and make sure it runs.

Exercise 3 *

Consider the following (also glaringly uncommented and obscure due to bad variable names) Python code:

```

1 x = 0
2
3 z = int(input("Enter integer: "))
4
5 y = [None] * z
6
7 for i in range(z):
8     y[i] = int(input("Enter another integer: "))
9     x += y[i]
10
11 if z > 0:
12     print("Result: " + str(x))

```

1. What does this Python code do?
2. Translate the above program into MIPS, making sure your translation is faithful (you will of course have to translate the **for** into a **while**, as we have seen in the lectures) and you use meaningful label names.
3. Load it in MARS and make sure it runs.

Exercise 4

1. Explain how instructions **sll** and **sra** can be used to do multiplication and division of integers.
2. Write some MIPS code to show how to use a shift instruction to perform the multiplication 8×6 .

Exercise 5

Extend exercise 3 above to add MIPS code that determines if the list you read encodes a palindrome. For example, list [1,2,3] does not encode a palindrome, while [1,2,3,2,1] does.