FIT1008 Introduction to Computer Science
Practical Session 4

Semester 2, 2014

Objectives of this practical session

To be able to write MIPS programs involving decisions, simple arthimetic calculations, loops, and lists.

***Task 1** [3 marks]*

A *Pythagorian triple* consists of three positive integers, a, b, and c, such that $a^2 + b^2 = c^2$.

(i) Write a Python program `pythagorian.py`, which read two positive integers, m and n, and prints the Pythagorian triple $a = |m^2 - n^2|$, $b = 2mn$ and $c = m^2 + n^2$.

(ii) Write a MIPS program which reads in an integer, m, and prints out its absolute value, $|m|$.

(iii) Write a MIPS program which reads in read two positive integers, m and n, and prints the Pythagorian triple $a = |m^2 - n^2|$, $b = 2mn$ and $c = m^2 + n^2$.

***Task 2** [3 marks]*

In the Gregorian calendar a *year* is a *leap year* if the *year* is divisible by 4 but not divisible by 100, or if the *year* is divisible by 400.

(i) Write a Python program `isLeapYear.py`, which reads in a year (i.e., an integer ≥ 1582), and if the *year* is a leap year prints "Is a leap year", otherwise prints "Is not a leap year".

(ii) Write a MIPS program which implements `isLeapYear.py`.

Task 3 [4 marks]

Write a MIPS program which does the following:

(i) Reads in the size of the `the_list`.

(ii) Reads in all the items of `the_list`.

(iii) Sums items in `the_list`, beginning at `the_list[0]` and ending *as soon as a negative number is reached*. If the first item of `the_list` is negative or `the_list` is empty, the function should return 0.

Advanced Question [Bonus 2 marks]

In Melbourne people put out a *green* bin (green waste) and *yellow* bin (recyclable waste) on alternative weeks. So, if you have put out your *yellow* bin this week, next week you would put out your *green* bin. Now suppose you know that Monday is your rubbish collection day, and on Monday 10th March 2014 you put out your *yellow* bin.

(i) Write a Python program `whichBin.py` which reads in a day and month (represented as integers) and prints out a message saying which bin you should put out next Monday.

(ii) Write a MIPS program which implements `whichBin.py`.

Hall of Fame

(i) Write a Python program `calendar.py` which reads in a month and year (represented as integers) and prints out a calendar for that month in the given year.

(ii) Write a MIPS program which implements `calendar.py`.