COMP1047 Lab Week 03

1. Work out the unsigned binary representation for the following decimal numbers by hand.
   (a) 45 (b) 1026

2. Write a MIPS program to load the numbers above into registers $s0 and $s1 as unsigned numbers. You can place the binary value directly in the data memory segment and then use `lw` instruction to load them into registers. For example, the following program stores two unsigned integers $0000000A_{16}$ and 10000000_{16} in the data segment of the memory and then loads the first integer in $s0 using `lw` instruction.

```
      .data
uint: .word 0x0000000A 0x10000000
      .text
      .globl main
main:
      la $t0, uint            #load the base address
      lw $s0, 0($t0)    #load the first integer into $s0
```

   Note that here we use assembler directive **.word**. You can find more assembler directives from pages A-47 to A-49 of the textbook. Now print out both numbers to the console using the **syscall** function. Check the output to see whether it is expected.

3. Work out the 2's complement representation for the following decimal numbers by hand.
   (a) 45 (b) -130

   Write a similar program in the previous question, load both numbers into registers and print them out to the QtSpim console, check whether your outputs are correct.

4. Write a program in MIPS32 assembly language which reads two integer numbers x and y from the console, calculates, then prints x – 2y – 40. *Hint: no multiplication is necessary and proper user prompts are expected.*

   To read an integer from the console:

```
li  $v0, 5   # read_int
syscall
# $v0 contains the number just entered
```

   To print an integer to the console:

```
# $a0 contains the number to be printed
li  $v0, 1   # print_int
syscall
```