Exercise for Test 1 (17/11/21)

1. Consider the following code is executed using a single cycle processor running at 2GHz clock rate.

```
li      $s1,2
li      $s2,5
next:
subu    $s2,$s2,1
bne     $s1,$s2,next
```

   a. What is the cycle time of the processor? (1m)
      $1/2x10^9 = 0.5x10^{-9}$ s = 0.5 ns
   b. How long does it take (in seconds) to complete the code execution? (1m)
      8 cycles = 8 x 0.5 ns = 4 ns
   c. How many clock cycles would it take to complete the code execution? (1m)
   d. What are the values of s1 and s2 from the start till the end? (2m)

$s1	2	2	2	2
$s2	5	4	3	2

   e. How many rounds of loops are there in the program? (1m)
      3

2. Using MARS simulator, create a program that gets a word of input from user, then capitalise all the letters. The following requirements are to be met:
   a. Prompt a welcoming message to the user ("Welcome to capitalise your word") (1 mark)
   b. Prompt a message to the user to enter a word. The word must be of exactly 5 characters of small letters only. (e.g. water) (4 marks)
   c. Manipulate the word by changing the 5 characters to be all capital letters. (e.g. WATER) (4 marks)
   d. Prompt the user with the manipulated word. (e.g. WATER) (1 mark)
   e. Optimise the code to use procedures whenever possible (at least 1 procedure). (5 marks)
   f. Make sure you use proper label names and include relevant and appropriate comments. (4 marks)

Compile and run your program using MARS simulator. Then, attach you asm file.