Problem 1
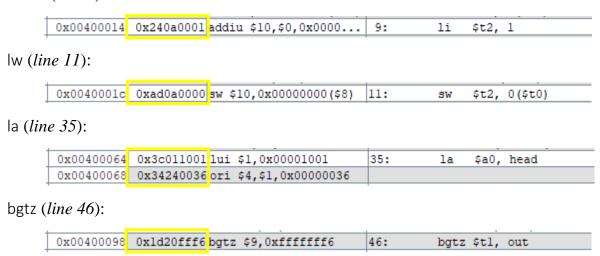
Run the sample Fibonacci program (**Fibonacci.asm**) on the MARS simulator and observe the following MIPS instructions:

addiu (*line 9*):

```
0x00400014  0x240a0001 addiu $10,$0,0x0000...   9:        li    $t2, 1
```

lw (*line 11*):

```
0x0040001c  0xad0a0000 sw $10,0x00000000($8)   11:        sw    $t2, 0($t0)
```

la (*line 35*):

```
0x00400064  0x3c011001 lui $1,0x00001001       35:        la    $a0, head
0x00400068  0x34240036 ori $4,$1,0x00000036
```

bgtz (*line 46*):

```
0x00400098  0x1d20fff6 bgtz $9,0xfffffff6      46:        bgtz  $t1, out
```

a) Identify the memory address of the above instructions.
b) Based on instruction format of the above instructions, explain their machine codes (shown in the yellow boxes).

*Hint: Read **MIPS.pdf** for the detailed format of MIPS R2000 instructions.*

Problem 2

Write an MIPS assembly program using numerical integration to calculate the area between the curve defined by the function $f(x) = \frac{c}{(a|x|+b)^2}$, the *x-axis*, and the two lines $x = d$ and $x = -d$ (namely *stripped area*), where **a**, **b**, **c**, and **d** are unsigned integers.

Hint: Students can use any area approximation methods, for example, rectangle/trapezoid method, Simpson's method, etc.

- Input:
  - **a, b, c, d** (as described above)
  - **n** – the number of small rectangles/trapezoids that shape the stripped area to adjust the accuracy of area calculation, $n \subset \mathbb{N}$, $10 \le n \le 30$.
- Output:
  - The stripped area.
  - Sample output: "**The stripped area is XX.XXX unit squares**"