

**Question 4 (25 points):**

The first function is called `fun`. Given the value of an integer  $i$ , `fun` computes the value of an integer  $f_i$ , that is defined by the following equations:

$$\begin{aligned}f_0 &= 1 \\f_1 &= 2 \\f_i &= f_{i-2} + (-1)^i \times f_{i-1}\end{aligned}\tag{1}$$

Hint: another way to write the expression for  $f_i$  is as follows:

$$f_i = \begin{cases} 1 & \text{if } i = 0 \\ 2 & \text{if } i = 1 \\ f_{i-2} - f_{i-1} & \text{if } i \neq 1 \text{ and } i \text{ is odd} \\ f_{i-2} + f_{i-1} & \text{if } i \neq 0 \text{ and } i \text{ is even} \end{cases}\tag{2}$$

The specification for `fun` is as follows:

- **parameters:**

- `$a0`:  $i$

- **return value:**

- `$v0`:  $f_i$

- **guarantee:**

- The value of  $i$ , all the intermediate values, and of  $f_i$  can be expressed as 32-bit integers.

Your implementation of `fun` must follow all the MIPS calling conventions for saving/restoring registers.

[illegible]

**Question 5 (25 points):** The second function that you will write is `maxfun`. Given an integer  $k$ , `maxfun` returns the maximum value of  $f_i$  in the interval  $[0, k]$ . The `[ ]` indicates that the limits of the interval are included in the computation of the maximum. To compute  $f_i$  `maxfun` must call the function `fun`. The specification for `maxfun` is as follows:

- **parameters:**

`$a0`:  $k$

- **return value:**

`$v0`: maximum value of  $f_i$  in the interval  $[0, k]$ .

- **guarantee**

- the value of  $f_i$  in all points in the interval  $[0, k]$  can be expressed as a 32-bit integer.

[illegible]