

Question 1: (0 points)
Bank of Questions

RISC-V Assembly

In the following two questions you will write two functions: `fun` and `maxfun`.

Question 2: (20 points)
(V0C, V0D)

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:**

a0: 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 RISC-V calling conventions for saving/restoring registers.

Question 3: (20 points)

(V0B, V0C) The second function that you will write is `maxfun`. Given an integer k , `maxfun` returns the maximum value of f_i for 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:**
 - a0: maximum value of f_i in the interval $[0, k]$.
- **guarantee**
 - the value of f_i in all points for interval $[0, k]$ can be expressed as a 32-bit integer.