Lab 8

In this Lab, ARM assembly program.

Exercise 1: Here's an example of a C exercise that uses a function with a function as an argument. In this example, you'll create a program that calculates the sum of a series of numbers using a custom function to determine which numbers to include in the sum.

Start and End numbers (integers) are given with variables: “start” and “end” You must create four functions: “sumSeries”, “isEven”, “isMul pleOfThree”.

sumSeries – must receive star ng value, end value, and another function pointer. (either “isEven” or “isMul pleOfThree”). It will calculate the sum of numbers from “start” to “end” that satisfies the condition given in the argument function (isEven or isMultipleOfThree). isEven – receives one integer number as an argument, and returns either 1 or 0 if number is even or not.

isMultipleOfThree – also receives one integer number as an argument, returns 1 if number is multiple of 3 (3,6,9,…)

Use following structure to complete the exercise:

|  |
| --- |
| #include <stdio.h>    int sumSeries(int start, int end, int (\*selector)(int)); int isEven(int num);  int isMultipleOfThree(int num);    /\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/ int main()  {  int start, end; start = 2; end = 12;    int sumEven = // YOUR CODE int sumMultipleOfThree = // YOUR CODE    printf("Sum of even numbers: %d\n", sumEven); printf("Sum of numbers divisible by three: %d\n", sumMultipleOfThree);    return 0;  }  /\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/ int sumSeries(int start, int end, int (\*selector)(int)) {  // YOUR CODE  }  /\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/ int isEven(int num)  {  // YOUR CODE  }  /\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/ int isMultipleOfThree(int num)  {  // YOUR CODE  } |

In assembly ARM v8, there is no division instruction. But checking for even or multiple of three characteriscs can be done with different approaches without using division operation.

Complete following assembly code which corresponds to the C code above:

.data start: .dword 2 end: .dword 12 sumEven: .dword 0

sumMultipleOfThree: .dword 0

.text .global \_start \_start: