HOME PROJECT ON RATIONAL NUMBER ARITHMETIC

CS342

Instructor: Professor Izidor Gertner

SPRING 2023

What to deliver:

1. Screenshots of the source code and output for Task1, and Task 2 is due by March 13, 2023 , 12::00 PM.
2. Screenshots of MIPS assembly source code in MARS and output for Task3 is due by March 15, 2023 ,12::00 PM.

3. Complete report for Tasks 1,2,3, **NEW 4** is due by March 15, 2023 , 12::00 PM.

Your report should follow the report format posted on Slack.

Task 1. Create Rational class in C++. It should include functions

add_rational,
sub_rational,
mul_rational,
div_rational,
print_rational,
Is_rational

Task 2. Write main() to test the rational class you have created.

Your main function should look something like the code shown below:

```
int main()
{

    int a, b, c, d;
    cout << "rational(a,b): Enter a,b" << endl;
    cin >> a >> b;
    cout << "rational(c,d): Enter c,d" << endl;
    cin >> c >> d;

    rational r1(a, b);
    rational r2(c, d);
    rational r3 = r1 + r2;
    rational r4 = r1 - r2;
    rational r5 = r1 * r2;
    rational r6 = r1 / r2;
```

The output should look something like:

```
rational(3/4) + rational(1/2) = rational(10/8)
rational(3/4) - rational(1/2) = rational(2/8)
rational(3/4) * rational(1/2) = rational(3/8)
rational(3/4) / rational(1/2) = rational(6/4)
```

Your code should detect attempt to construct non valid rational number. E.g. Attempt to create rational(5/0) should through an error. Attempt to divide by 0 should through an error.

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Task 3. Write MIPS assembly code for rational number arithmetic instructions:

```
add_rational,
sub_rational,
mul_rational,
div_rational.
```

Please write one MIPS assembly program for each operation, and test using MARS simulator. **NO NEED TO CREATE CLASS!**

NEW TASK

Task 4. Define MIPS assembly MACROS code for rational number arithmetic instructions for all functions used in C++ code:

```
add_rational,
sub_rational,
mul_rational,
div_rational.
Print_rational,
Is_Rational
```

Please write MIPS assembly code for MARCOS you have defined. Test and demonstrate y9ourv MACROS using MARS simulator.

LINK to MACROS GUIDE:

https://courses.missouristate.edu/kenvollmar/mars/help/MacrosHelp.html