Structures Program

COSC-230
Assignment

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Topics

- Assignment

- Requirements

- Testing

- Plagiarism

- Submission

Task

- You will be writing one assembly function.

```
RightTriangle make_triangle(float side0, float side1);
```

- The RightTriangle structure is defined as follows.

```
struct RightTriangle {
    float s0;           // side 0
    float s1;           // side 1
    float hypotenuse;
    float theta0;       // angle 0
    float theta1;       // angle 1
};
```

C++ Version

```cpp
RightTriangle make_triangle(float side0, float side1)
{
    RightTriangle rt;

    rt.side0 = side0;
    rt.side1 = side1;
    rt.hypotenuse = sqrt((side0 * side0) + (side1 * side1));

    rt.theta0 = asinf(side0 / rt.hypotenuse);
    rt.theta1 = asinf(side1 / rt.hypotenuse);

    return rt;
}
```

Requirements

- You must <u>properly</u> use the stack so that you can call the asinf function.

- Use numeric labels for your loop.

- Use the ABI names for registers
  - ABI names: t0, a0, s0, etc.
  - Index names: x10, x15, x20, etc.

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Testing

- The .cpp template file executes your make_triangle function.

- It is executed through the command line arguments.

- Compile with the following command.

```
~> riscv64-unknown-linux-gnu-g++ -o lab lab.cpp lab.S
~> ./lab
```

Example #1

```
~> ./lab 10 2
S0: 10.00, S1: 2.00, HYP: 10.20 Angles: (90, 78.69, 11.31) [VALID]
```

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Example #2

```
~> ./lab 50 12
S0: 50.00, S1: 12.00, HYP: 51.42 Angles: (90, 76.50, 13.50) [VALID]
```

Example #3

```
~> ./lab 150 1200
S0: 150.00, S1: 1200.00, HYP: 1209.34 Angles: (90, 7.13, 82.88) [VALID]
```

Example #4

```
~> ./lab 0.55 0.12
S0: 0.55, S1: 0.12, HYP: 0.56 Angles: (90, 77.69, 12.31) [VALID]
```

Plagiarism Policy

- This is an **individual assignment**.

- You must NOT be able to see anyone else's code.

- Do NOT send your code and do not accept someone sending you code.

- Do NOT use any online source, such as Chegg, Stackoverflow, etc.

- You MAY use the online notes that I have created for you.

- You MUST cite anyone with whom you worked with, including classmates, students in another class, professors, and TAs.
  - Please note that even if you cite another student, professor, or TA, it does NOT mean you may share code.

- If you cannot attest to the truthfulness of not cheating using the bullets above. DO NOT submit your code. It is better just to get a 0 here and let it be done. If you proceed with copied code, the office of Student Conduct and Community Standards (SCCS) will become involved.

Submission

- Make sure your code compiles and assembles with the following command.

```
~> riscv64-unknown-linux-gnu-g++ -o lab lab.cpp lab.S
~> ./lab
```

- Replace **lab** with the name of your lab.
  - Make sure you have comments in your code, including a header and inline comments.
  - Submit only your .S file.

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