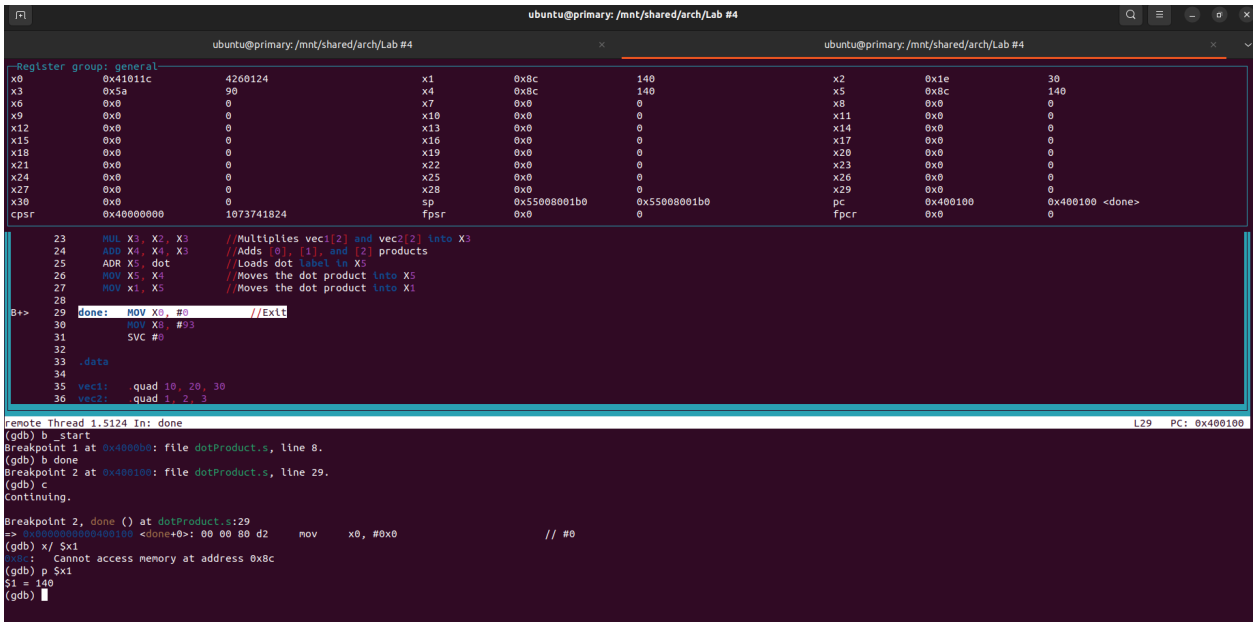
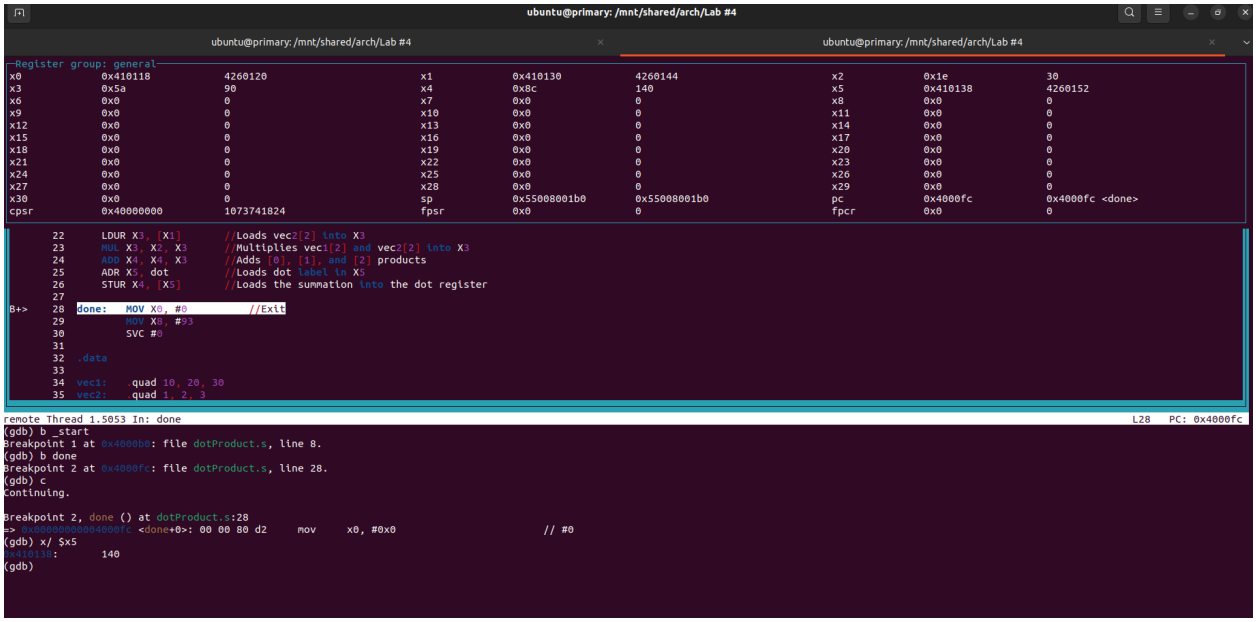
Pledge: I pledge my honor that I have abided by the Stevens Honor System.
Name: Haig Emirzian

Lab #4 With GDB

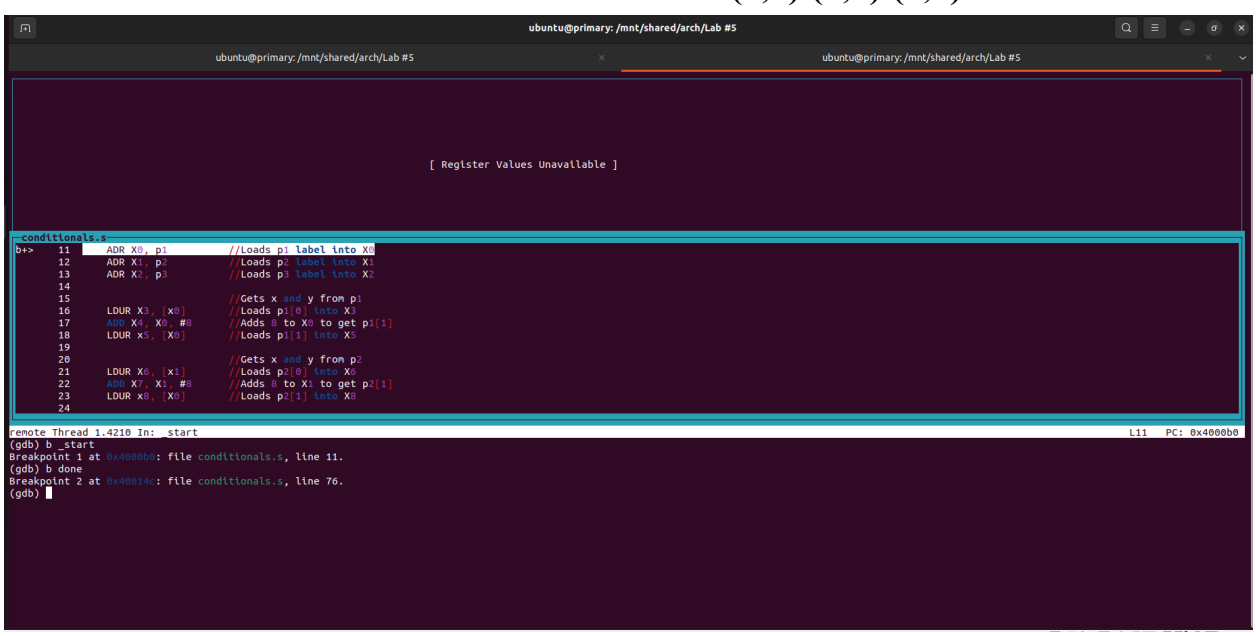


After setting up my terminals, my first commands were two breakpoints. The first breakpoint is at the start of the program: **b _start.** My second breakpoint is at the label where my program finishes: **b _done.** I used the continue command to jump straight to the done label to exit the code: **c**. I then used **x/ $x1** to find the value of X1, but I couldn't access it. I went back to look at my code and I forgot to store the value back into memory. Therefore, I went back to my code and stored the dot product into register X5



I then used the command **x/ $x5** to dereference register 5 and print out its value, which happens to be the dot product of **140**.

Lab #5 With Default Points (0,0) (0,2) (2,0)



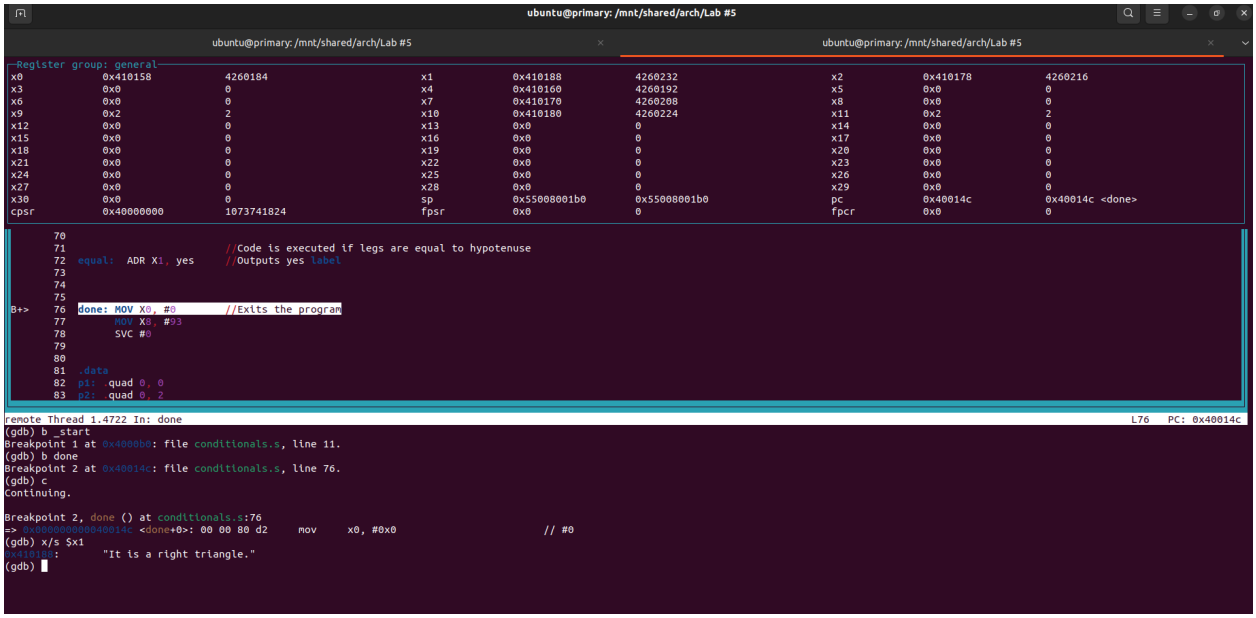
After setting up my terminals, my first commands were two breakpoints. The first breakpoint is at the start of the program: **b _start.** My second breakpoint is at the label where my program finishes: **b _done.**

```
ubuntu@primary: /mnt/shared/arch/Lab #5
ubuntu@primary: /mnt/shared/arch/Lab #5
ubuntu@primary: /mnt/shared/arch/Lab #5
Register group: general
x0             0x410158           4260184                    x1             0x410188           4260232                    x2             0x410178           4260216
x3             0x0                0                          x4             0x410160           4260192                    x5             0x0                0
x6             0x0                0                          x7             0x410170           4260208                    x8             0x0                0
x9             0x2                2                          x10            0x410180           4260224                    x11            0x2                2
x12            0x0                0                          x13            0x0                0                          x14            0x0                0
x15            0x0                0                          x16            0x0                0                          x17            0x0                0
x18            0x0                0                          x19            0x0                0                          x20            0x0                0
x21            0x0                0                          x22            0x0                0                          x23            0x0                0
x24            0x0                0                          x25            0x0                0                          x26            0x0                0
x27            0x0                0                          x28            0x0                0                          x29            0x0                0
x30            0x0                0                          sp             0x55008001b0       0x55008001b0               pc             0x40014c           0x40014c <done>
cpsr           0x40000000         1073741824                 fpsr           0x0                0                          fpcr           0x0                0
      70
      71                          //Code is executed if legs are equal to hypotenuse
      72  equal:  ADR X1, yes     //Outputs yes label
      73
      74
      75
B+>   76  done: MOV X0, #0        //Exits the program
      77        MOV X8, #93
      78        SVC #0
      79
      80
      81  .data
      82  p1:  .quad 0, 0
      83  p2:  .quad 0, 2
remote Thread 1.4210 In: done                                                                                L76   PC: 0x40014c
(gdb) b _start
Breakpoint 1 at 0x4000b0: file conditionals.s, line 11.
(gdb) b done
Breakpoint 2 at 0x40014c: file conditionals.s, line 76.
(gdb) c
Continuing.

Breakpoint 2, done () at conditionals.s:76
=> 0x000000000040014c <done+0>: 00 00 80 d2     mov     x0, #0x0                        // #0
(gdb)
```

I used the continue command to jump straight to the done label to exit the code: **c**.

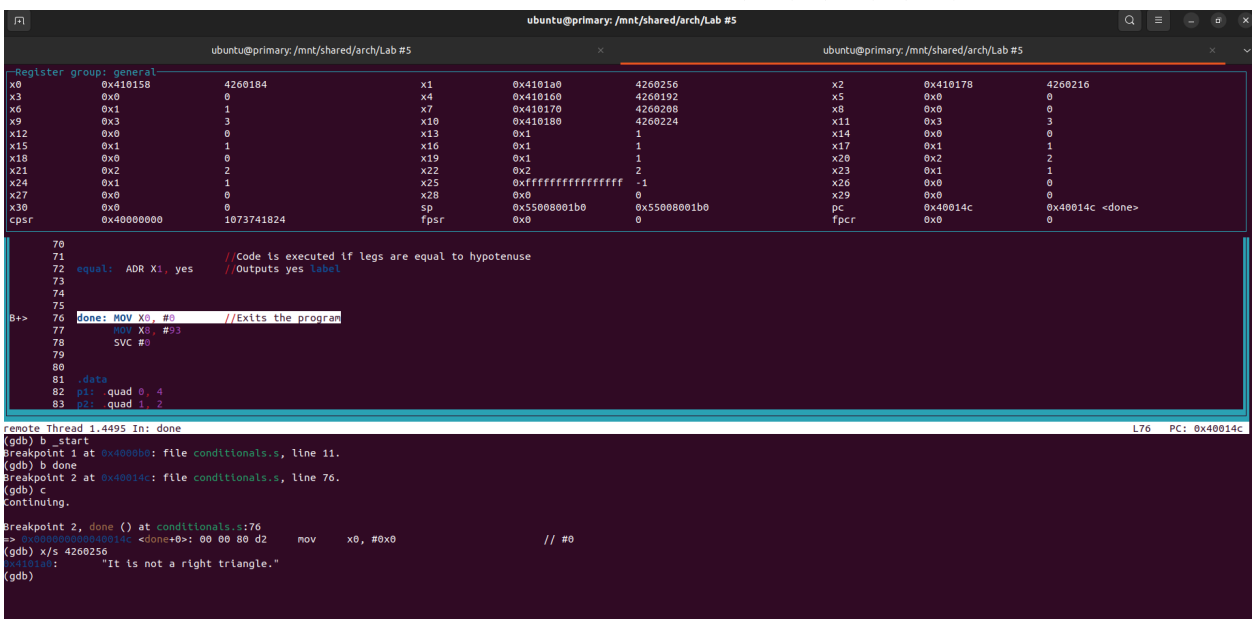
```
ubuntu@primary: /mnt/shared/arch/Lab #5
ubuntu@primary: /mnt/shared/arch/Lab #5
ubuntu@primary: /mnt/shared/arch/Lab #5
Register group: general
x0             0x410158           4260184                    x1             0x410188           4260232                    x2             0x410178           4260216
x3             0x0                0                          x4             0x410160           4260192                    x5             0x0                0
x6             0x0                0                          x7             0x410170           4260208                    x8             0x0                0
x9             0x2                2                          x10            0x410180           4260224                    x11            0x2                2
x12            0x0                0                          x13            0x0                0                          x14            0x0                0
x15            0x0                0                          x16            0x0                0                          x17            0x0                0
x18            0x0                0                          x19            0x0                0                          x20            0x0                0
x21            0x0                0                          x22            0x0                0                          x23            0x0                0
x24            0x0                0                          x25            0x0                0                          x26            0x0                0
x27            0x0                0                          x28            0x0                0                          x29            0x0                0
x30            0x0                0                          sp             0x55008001b0       0x55008001b0               pc             0x40014c           0x40014c <done>
cpsr           0x40000000         1073741824                 fpsr           0x0                0                          fpcr           0x0                0
      70
      71                          //Code is executed if legs are equal to hypotenuse
      72  equal:  ADR X1, yes     //Outputs yes label
      73
      74
      75
B+>   76  done: MOV X0, #0        //Exits the program
      77        MOV X8, #93
      78        SVC #0
      79
      80
      81  .data
      82  p1:  .quad 0, 0
      83  p2:  .quad 0, 2
remote Thread 1.4446 In: done                                                                                L76   PC: 0x40014c
(gdb) b _start
Breakpoint 1 at 0x4000b0: file conditionals.s, line 11.
(gdb) b done
Breakpoint 2 at 0x40014c: file conditionals.s, line 76.
(gdb) c
Continuing.

Breakpoint 2, done () at conditionals.s:76
=> 0x000000000040014c <done+0>: 00 00 80 d2     mov     x0, #0x0                        // #0
(gdb) x/s 4260232
0x410188:       "It is a right triangle."
(gdb)
```

After continuing, I tried printing the string with the **x/s <address value>** command. The address value for X1 is 4260232; therefore, I typed **x/s 4260232.** As expected, the default coordinates do form a triangle.



To make sure the output was correct, I used the **x/s $x1** command to check the value of the x1 register, which prints out **"It is a right triangle."**

Lab #5 With Custom Points (0,4) (1,2) (3,2)



I ran the same commands as with the first potential triangle coordinates. First, I set the breakpoints at the start and at the label that exits my program: **b _start** and **b done.** I then used the continue command to jump to the end of my program: **c.** I then used the same printing string

command, **x/s,** with the address value presented in the terminal, **4260256.** As expected, my triangle is not a triangle.

```
Register group: general
x0             0x410158           4260184                    x1             0x4101a0           4260256                    x2             0x410178           4260216
x3             0x0                0                          x4             0x410160           4260192                    x5             0x0                0
x6             0x1                1                          x7             0x410170           4260208                    x8             0x0                0
x9             0x3                3                          x10            0x410180           4260224                    x11            0x3                3
x12            0x0                0                          x13            0x1                1                          x14            0x0                0
x15            0x1                1                          x16            0x1                1                          x17            0x1                1
x18            0x0                0                          x19            0x1                1                          x20            0x2                2
x21            0x2                2                          x22            0x2                2                          x23            0x1                1
x24            0x1                1                          x25            0xffffffffffffffff -1                         x26            0x0                0
x27            0x0                0                          x28            0x0                0                          x29            0x0                0
x30            0x0                0                          sp             0x55008001b0       0x55008001b0               pc             0x40014c           0x40014c <done>
cpsr           0x40000000         1073741824                 fpsr           0x0                0                          fpcr           0x0                0
conditionals.s
        72  equal:  ADR X1, yes     //Outputs yes label
        73
        74
        75
B+>     76  done: MOV X0, #0        //Exits the program
        77        MOV X8, #93
        78        SVC #0
        79
        80
        81  .data
        82  p1:  .quad 0, 4
        83  p2:  .quad 1, 2
remote Thread 1.4495 In: done                                                                          L76   PC: 0x40014c
Breakpoint 1 at 0x4000b8: file conditionals.s, line 11.
(gdb) b done
Breakpoint 2 at 0x40014c: file conditionals.s, line 76.
(gdb) c
Continuing.

Breakpoint 2, done () at conditionals.s:76
=> 0x000000000040014c <done+0>: 00 00 80 d2     mov     x0, #0x0                        // #0
(gdb) x/s 4260256
0x4101a0:       "It is not a right triangle."
(gdb) x $X1
Value can't be converted to integer.
(gdb) x/s $X1
Value can't be converted to integer.
(gdb) x/s $x1
0x4101a0:       "It is not a right triangle."
(gdb)
```

To make sure the output was correct, I used the **x/s $x1** command to check the value of the x1 register, which prints out **"It is not a right triangle."**