Homework # X
Last Name, First

CSIT230-X: Computer Systems
Instructor: Dr. G.E. Antoniou
Problem 1:
Arithmetic example (Assembly Language).

Solution:
Formula that calculates the delta for the following quadratic equation:
\[ \Delta = b^2 - 4ac \]
The program reads the values of a, b, and c from the user and loads them in the register. The program calculates the value of \( b^2 \) first. Then, it calculates the value of \( 4ac \). To do this we load the value 4 in a register. We subtract \( 4ac \) from \( b^2 \). Then, the program outputs the value to the user.

Code:

```assembly
# Homework X. Problem 1
# This program calculates the value: Delta = b^2 - 4ac
.text
.globl main
main:
    # prints "This program calculates the Delta for quadratic equations: ":
    la $a0, welcomeMessage
    li $v0, 4
    syscall

    # prints "Please enter a: ":
    la $a0, entera
    li $v0, 4
    syscall

    # inputs the value a
    li $v0, 5
    syscall
    move $t0, $v0

    # prints "Please enter b: ":
    la $a0, enterb
    li $v0, 4
    syscall

    # inputs the value b
    li $v0, 5
    syscall
    move $t1, $v0
```
# prints "Please enter c:"
    la $a0, enterc
    li $v0, 4
    syscall

# inputs the value c
    li $v0, 5
    syscall
    move $t2, $v0

# calculates $b^2$ and puts it in #s0
    mult $t1, $t1
    mflo $s0

# loads the constant 4 at $t4
    li $t4, 4

# calculates $4\cdot a$ and puts it in $s1
    mult $t4, $t0
    mflo $s1

# calculates $4\cdot a\cdot b$ and puts it in $s1
    mult $s1, $t2
    mflo $s1

# calculates delta = $b^2-4\cdot a\cdot c$ and puts it in $s0$
    sub $s0, $s0, $s1

# prints "Delta is:"
    la $a0, answer
    li $v0, 4
    syscall

# prints the output of the operation ($s0)
    move $a0, $s0
    li $v0, 1
    syscall

# exits the program
    li $v0, 10
    syscall
.data
welcomeMessage:
    .asciiz "This program calculates the Delta for quadratic equations: "
entera:
    .asciiz "Please enter a: "
enterb:
    .asciiz "Please enter b: "
enterc:
    .asciiz "Please enter c: "
answer:
    .asciiz "Delta is: "

Sample Run:

![Sample Run Image]

Comments:

The program runs correctly, according to the specifications.