Variant 1

# 6.1903: Quiz 3 (11/16/2026)

| **Name:** | **Kerberos:** |
|---|---|

Enter your answers in the boxes designated for each problem. Additional scratch paper can be provided but will not be considered in grading.

`app_main` calls `mystery_sum(a, b)`, shown on the next page, with two starting values that you are not told. The call to `mystery_sum` in `app_main` occurs at instruction `0x42009318`. The base case calls `mystery_bottom()`, which prints the stack at the moment it was called, starting at the current `sp` and going toward higher addresses. Study the code and stack snapshot on the next page and answer the questions below. (Feel free to separate the second page since we will only grade the first page.)

**1.** What two values `(a, b)` did `app_main` pass to `mystery_sum`? Give them in hexadecimal.

| | |
|---|---|
| `a = 0x2` | `b = 0x5` |

**2.** How many times had `mystery_sum` been called when the snapshot was taken, including the call that went to `mystery_base`?

`9`

**3.** What was the value of `sp` in `app_main` immediately before the `call mystery_sum` was executed?

`0x3fc9c0f0`

**4.** What is the address of the `add a0, a0, s0` instruction in `mystery_sum`?

`0x42008a6c`

**5.** When execution reaches `mystery_base`, what values (in hexadecimal) are in registers `a0` and `s0`?

| | |
|---|---|
| `a0 = 0x83` | `s0 = 0x51` |

**6.** What value does `mystery_sum` eventually return to `app_main`? **Give your answer in decimal.** (Show work in box for partial credit.)

`207`

Variant 1

*Feel free to separate this page from the first page! We will not be scanning it for grading.*

```
mystery_sum:
    li    t0, 100
    bgt   a0, t0, mystery_base  # a > limit: done
    addi  sp, sp, -12
    sw    ra, 8(sp)
    sw    s0, 4(sp)
    sw    a0, 0(sp)
    mv    s0, a0
    add   t1, a0, a1
    mv    a0, a1
    mv    a1, t1
    call  mystery_sum
    add   a0, a0, s0 # <--question 4
    lw    s0, 4(sp)
    lw    ra, 8(sp)
    addi  sp, sp, 12
    ret
mystery_base:
    addi  sp, sp, -4
    sw    ra, 0(sp)
    call  mystery_bottom # stack snapshot here
    lw    ra, 0(sp)
    addi  sp, sp, 4
    li    a0, 0
    ret
```

```
0x3fc9c08c: 0x42008a6c
0x3fc9c090: 0x00000051
0x3fc9c094: 0x00000032
0x3fc9c098: 0x42008a6c
0x3fc9c09c: 0x00000032
0x3fc9c0a0: 0x0000001f
0x3fc9c0a4: 0x42008a6c
0x3fc9c0a8: 0x0000001f
0x3fc9c0ac: 0x00000013
0x3fc9c0b0: 0x42008a6c
0x3fc9c0b4: 0x00000013
0x3fc9c0b8: 0x0000000c
0x3fc9c0bc: 0x42008a6c
0x3fc9c0c0: 0x0000000c
0x3fc9c0c4: 0x00000007
0x3fc9c0c8: 0x42008a6c
0x3fc9c0cc: 0x00000007
0x3fc9c0d0: 0x00000005
0x3fc9c0d4: 0x42008a6c
0x3fc9c0d8: 0x00000005
0x3fc9c0dc: 0x00000002
0x3fc9c0e0: 0x42008a6c
0x3fc9c0e4: 0x00000002
0x3fc9c0e8: 0x0000000b
0x3fc9c0ec: 0x4200931c
0x3fc9c0f0: 0x00000000
0x3fc9c0f4: 0x3fc94c3c
0x3fc9c0f8: 0x3fc9c160
0x3fc9c0fc: 0x42009c2c
```