►Solution◄

String Processing

Question 1: (15 points)

(V02, V03, V08) Each null-terminated string in Figure 1 corresponds to an Alberta license plate number. All license plates have the same number of characters. The first string in the list corresponds to `plates[0]`.

```
1   # license-plate array
2   .data
3   plates:
4       .asciz "GFC-906"
5       .asciz "FNL-909"
6       .asciz "BTP-610"
7       .asciz "GTC-883"
8       .asciz "KCH-135"
9       .asciz "JCW-320"
10      .asciz "MPV-591"
11      .asciz "MZL-574"
```

Figure 1: An array of Alberta license plates.

Question 2: (5 points)

Write the shortest sequence of RISC-V instructions that places the address of the first character of `plates[3]` into register `a0`.

Solution:

```
la   a0, plates
addi a0, a0, 24
```

Question 3: (5 points)

Assume that register `a1` contains an unsigned integer value `k`. Write the shortest sequence of RISC-V instructions that places the address of the first character of `plates[k]` in `a0`.

Solution:

```
la    a0, plates     # a0 <-- &(plates[0])
slli  a1, a1, 3      # a1 <-- 8*k
add   a0, a0, a1     # a0 <-- &(plates[k])
```

Question 4: (5 points)

Write the shortest sequence of RISC-V instructions that loads the third character of `plates[5]` (this is the "`W`" character) into `t0`.

Solution:

```
la    t1, plates     # t1 <-- &(plates[0])
lbu   t0, 42(t1)     # t0 <-- Mem[plates+42]
```