```
inp w        w = a₁
mul x 0
add x z
mod x 26
div z 1
add x 13
eql x w
eql x 0
mul y 0
add y 25
mul y x
add y 1
mul z y
mul y 0
add y w
add y 10
mul y x
add z y
inp w
mul x 0
add x z
mod x 26
div z 1
add x 11
eql x w
eql x 0
```

$w = a_1$

$x = 13$

$x = a_1 \stackrel{?}{=} 13 = 0$

$x = 1$

$y = 25$

$y = 26$

$y = 0$

$y = a_1$

$y = a_1 + 10$

$z = a_1 + 10$

$w = a_2$

$x = (a_1 + 10) \% 26 = a_1 + 10$

$x = a_1 + 21 \neq a_2 = 1$

$a_i \in [1, 9]$

$[\text{div } a \, b] : b \neq 0$

$[\text{mod } a \, b] : a \geq 0$
$\phantom{[\text{mod } a \, b] :} b > 0$

```
mul y 0
add y 25
mul y x
add y 1
mul z y
mul y 0
add y w
add y 16
mul y x
add z y
inp w
mul x 0
add x z
mod x 26
div z 1
add x 11
eql x w
eql x 0
mul y 0
add y 25
mul y x
add y 1
mul z y
mul y 0
add y w
add y 0
```

$y = 26$

$z = 26(a_1 + 10)$

$y = a_2 + 16$

$z = 26(a_1 + 10) + a_2 + 16$

$w = a_3$

$x = a_2 + 16$

$x = a_2 + 27 \neq a_3 = 1$

$y = 26$

$z = 26(26(a_1 + 10) + a_2 + 16)$

$y = a_3$

$w = a_2$
$x = 1$
$y = a_1 + 10$
$z = a_1 + 10$

~~mul y x~~
add z y $\quad z = 26(26(a_1+10)+a_2+16)+a_3$
inp w $\quad w = a_4$
mul x 0 ⎫
add x z ⎬ $x = a_3$
mod x 26 ⎭

~~div z 1~~
add x 10 ⎫
eql x w ⎬ $x = a_3 + 10 \neq a_4 = 1$
eql x 0 ⎭
mul y 0 ⎫
add y 25 ⎬ $y = 26$
mul y x ⎪
add y 1 ⎭
mul z y $\quad z = c^3(a_1+10) + c^2(a_2+16) + c a_3$
mul y 0 ⎫
add y w ⎬ $y = a_4 + 13$
add y 13 ⎪
mul y x ⎭
add z y $\quad z = c^3(a_1+10) + c^2(a_2+16) + c a_3 + a_4 + 13$
inp w $\quad w = a_5$
mul x 0 ⎫
add x z ⎬ $x = a_4 + 13$
mod x 26 ⎭
div z 26 $\quad z = c^2(a_1+10) + c(a_2+16) + a_3$
add x -14 $\quad x = a_4 - 1$

$\begin{cases} w = a_3 \\ x = 1 \\ y = a_3 \\ z = 26(26(a_1+10)+a_2 \\ \qquad +16) \end{cases}$

$\boxed{\text{let } c = 26}$

```
eql x w
eql x 0
mul y 0
add y 25
mul y x
add y 1
mul z y
mul y 0
add y w
add y 7
mul y x
add z y
inp w
mul x 0
add x z
mod x 26
div z 26
add x -4
eql x w
eql x 0
mul y 0
add y 25
mul y x
add y 1
mul z y
mul y 0
```

$x = a_5 \equiv a_4 - 1$

$x = a_5 \neq a_4 - 1 = p()$

$\left.\begin{array}{l} \\ \\ \end{array}\right\} y = p(26, 1)$

$z = p(c \ldots), \_ : c^2(a_1+10) + c(a_2+16) + a_3)$

$\left.\begin{array}{l} \\ \\ \end{array}\right\} y = a_5 + 7$

$y = p() \cdot (a_5 + 7)$

$z = c^2(a_1+10) + c(a_2+16) + a_3$

$w = a_6$

$\left.\begin{array}{l} \\ \\ \end{array}\right\} x = a_3$

$z = c(a_1+10) + a_2 + 16$

$\left.\begin{array}{l} \\ \\ \end{array}\right\} x = a_3 - 4 \neq a_6 \uparrow 0$

$\left.\begin{array}{l} \\ \\ \end{array}\right\} y = 1$

~~mul z y~~

mul y 0 $y = 0$

Right side annotations:

$w = a_5$

$x = a_4 - 1$

$y = a_4 + 13$

$z = c^2(a_1+10) + c(a_2+16) + a_3$

Box 1:
minimize(z)
$\Rightarrow p() \equiv 0$

$a_4 - 1 \equiv a_5$

Box 2:
$a_3 - 4 \equiv a_6$

```
add y w  ⎫
add y 11 ⎬ y = 0
mul y x  ⎭
add z y
inp w      w = a_7
mul x 0  ⎫
add x z  ⎬ x = a_2 + 16
mod x 26 ⎭
div z 1
add x 11 ⎫
eql x w  ⎬ x = a_2 + 27 ≠ a_7 = 1
eql x 0  ⎭
mul y 0  ⎫
add y 25 ⎬ y = 26
mul y x  ⎭
add y 1
mul z y   z = c²(a_1 + 10) + c(a_2 + 16)
mul y 0  ⎫
add y w  ⎬ y = a_7 + 11
add y 11 ⎭
mul y x
add z y   z = c²(a_1 + 10) + c(a_2 + 16) + a_7 + 11
inp w      w = a_8
mul x 0  ⎫
add x z  ⎬ x = a_7 + 11
mod x 26 ⎭
```

$y = 0$

$$x = a_2 + 16$$

$$x = a_2 + 27 \neq a_7 = 1$$

$$y = 26$$

$$z = c^2(a_1 + 10) + c(a_2 + 16)$$

$$y = a_7 + 11$$

$$z = c^2(a_1 + 10) + c(a_2 + 16) + a_7 + 11$$

$$x = a_7 + 11$$

Right column:

$$w = a_6$$
$$x = 0$$
$$y = 0$$
$$z = c(a_1 + 10) + a_2 + 16$$

```
div z 26
add x -3
eql x w
eql x 0
mul y 0
add y 25
mul y x
add y 1
mul z y
mul y 0
add y w
add y 10
mul y x
add z y
inp w
mul x 0
add x z
mod x 26
div z 1
add x 12
eql x w
eql x 0
mul y 0
add y 25
mul y x
add y 1
```

$z = c(a_2 + 10) + a_2 + 16$

$x = a_7 + 8 \neq a_8 \uparrow 0$

$y = 1$

$y = 0$

$w = a_9$

$x = a_2 + 16$

$x = a_2 + 28 \neq a_9 = 1$

$y = 26$

$w = a_8$
$x = a_7 + 11$
$y = a_7 + 11$
$z = c^2(a_1 + 10) +$
$\quad c(a_2 + 16) +$
$\quad a_7 + 11$

$\boxed{\begin{array}{l} a_7 + 8 \equiv a_8 \\ \Rightarrow a_7 = 1 \\ \qquad a_8 = 9 \end{array}}$

```
mul z y   z = c²(a₁+10) + c(a₂+16)
mul y 0
add y w
add y 16
mul y x
add z y   z = c²(a₁+10) + c(a₂+16) + a₉ + 16
inp w     w = a₁₀
mul x 0
add x z
mod x 26
div z 26  z = c(a₁+10) + a₂+16
add x -12
eql x w
eql x 0
mul y 0
add y 25
mul y x
add y 1
mul z y
mul y 0
add y w
add y 8
mul y x
add z y
inp w     w = a₁₁
mul x 0
```

$z = c^2(a_1+10) + c(a_2+16)$

$y = a_9 + 16$

$z = c^2(a_1+10) + c(a_2+16) + a_9 + 16$

$x = a_9 + 16$

$z = c(a_1+10) + a_2 + 16$

$x = a_9 + 4 \neq a_{10} \nearrow 0$

$y = 1$

$y = 0$

$x = 0$

$w = a_9$
$x = 1$
$y = 26$
$z = c(a_1+10) + a_2 + 16$

$\boxed{a_9 + 4 \overset{\sim}{=} a_{10}}$

```
add x z          } x = a₂ + 16
mod x 26         }
div z 1
add x 13         }
eql x w          } x = a₂ + 29 ≠ a₁₁ ≐ 1
eql x 0          }
mul y 0          }
add y 25         } y = 26
mul y x          }
add y 1          }
mul z y      z = c²(a₁ + 10) + c(a₂ + 16)
mul y 0          }
add y w          } y = a₁₁ + 15
add y 15         }
mul y x          }
add z y      z = c²(a₁ + 10) + c(a₂ + 16) + a₁₁ + 15
inp w        w = a₁₂
mul x 0          }
add x z          } x = a₁₁ + 15
mod x 26         }
div z 26     z = c(a₁ + 10) + a₂ + 16
add x -12        }
eql x w          } x = a₁₁ + 3 ≠ a₁₂ ↗ 0
eql x 0          }
mul y 0          }
add y 25         } y = 25
```

```
add x z
mod x 26
div z 1
```
$x = a_2 + 16$

```
add x 13
eql x w
eql x 0
```
$x = a_2 + 29 \neq a_{11} \doteq 1$

```
mul y 0
add y 25
mul y x
add y 1
```
$y = 26$

```
mul z y
```
$z = c^2(a_1 + 10) + c(a_2 + 16)$

```
mul y 0
add y w
add y 15
mul y x
```
$y = a_{11} + 15$

```
add z y
```
$z = c^2(a_1 + 10) + c(a_2 + 16) + a_{11} + 15$

```
inp w
```
$w = a_{12}$

```
mul x 0
add x z
mod x 26
```
$x = a_{11} + 15$

```
div z 26
```
$z = c(a_1 + 10) + a_2 + 16$

```
add x -12
eql x w
eql x 0
```
$x = a_{11} + 3 \neq a_{12} \nearrow 0$

```
mul y 0
add y 25
```
$y = 25$

Right side:

$w = a_{11}$

$x = 0$

$y = 0$

$z = c(a_1 + 10) + a_2 + 16$

Boxed:

$\boxed{a_{11} + 3 \doteq a_{12}}$

```
mul y x ⎫ y=1
add y 1 ⎭
mul z y          ← (struck through)
mul y 0 ⎫
add y w ⎪
add y 2 ⎬ y=0
mul y x ⎭
add z y          ← (struck through)
inp w     w=a₁₃
mul x 0 ⎫
add x z ⎬ x=a₂+16
mod x 26 ⎭
div z 26   z=a₁+10
add x -15 ⎫
eql x w   ⎬ x= a₂+1 ≠ a₁₃ → 0
eql x 0   ⎭
mul y 0 ⎫
add y 25 ⎪
mul y x ⎬ y=1
add y 1 ⎭
mul z y          ← (struck through)
mul y 0 ⎫
add y w ⎪
add y 5 ⎬ y=0
mul y x ⎭
add z y          ← (struck through)
```

$$w = a_{12}$$
$$x = 0$$
$$y = 25$$
$$z = c\,(a_1+10)+a_2+16$$

$$\boxed{a_2+1 \equiv a_{13}}$$

```
inp w      w = a₁₄
mul x 0 ⎫
add x z ⎬ x = a₁ + 10
mod x 26 ⎭
div z 26   z = 0
add x -12 ⎫
eql x w   ⎬ x = a₁ - 2 ≠ a₁₄ ↑0
eql x 0   ⎭
mul y 0 ⎫
add y 25 ⎬ y = 1
mul y x  ⎭
add y 1
mul z y
mul y 0 ⎫
add y w  ⎬ y = 0
add y 10 ⎭
mul y x
add z y
```

$$x = a_1 - 2 \neq a_{14} \uparrow 0$$

$$\boxed{a_1 - 2 \equiv a_{14}}$$

$a_1 - 2 = a_{14}$

$a_2 + 1 = a_{13}$

$a_3 - 4 = a_6$

$a_4 - 1 = a_5$

$a_7 = 1$

$a_8 = 9$

$a_9 + 4 = a_{10}$

$a_{11} + 3 = a_{12}$

	max	min
1	9	3
2	8	1
3	9	5
4	9	2
5	8	1
6	5	1
7	1	1
8	9	9
9	5	1
10	9	5
11	6	1
12	9	4
13	9	2
14	7	1