

(P1)

LDI R10, 9

L1: ADD R30, R31

DEC R10

BRNE L1

L2: Jmp L2

Subroutine

// staying here forever

~~BREQ~~
BREQ

(P2)

LDI R10, 9

L1: ADD R30, R31

DEC R10

BREQ L2

Jmp L1

L2: Jmp L2

(1)

R0-R31

1-1

BRNE: Branch when they're not equal

Branch → Jump

Branches of trees

P3

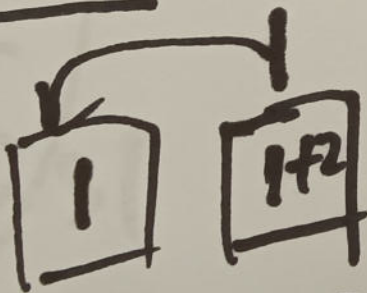
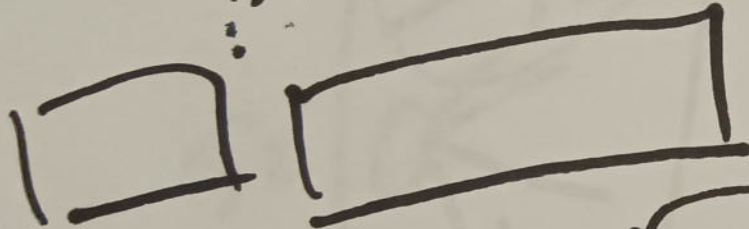
LDI R10, 9

LDI R11,

ADD R11, R10

DEC R10

BRNE



1+3

1+3+5

②

P4

1+3+5+...+27

LDI R10, 2

LDI R11, 1

LDI R12, 27

LDI R13, 10

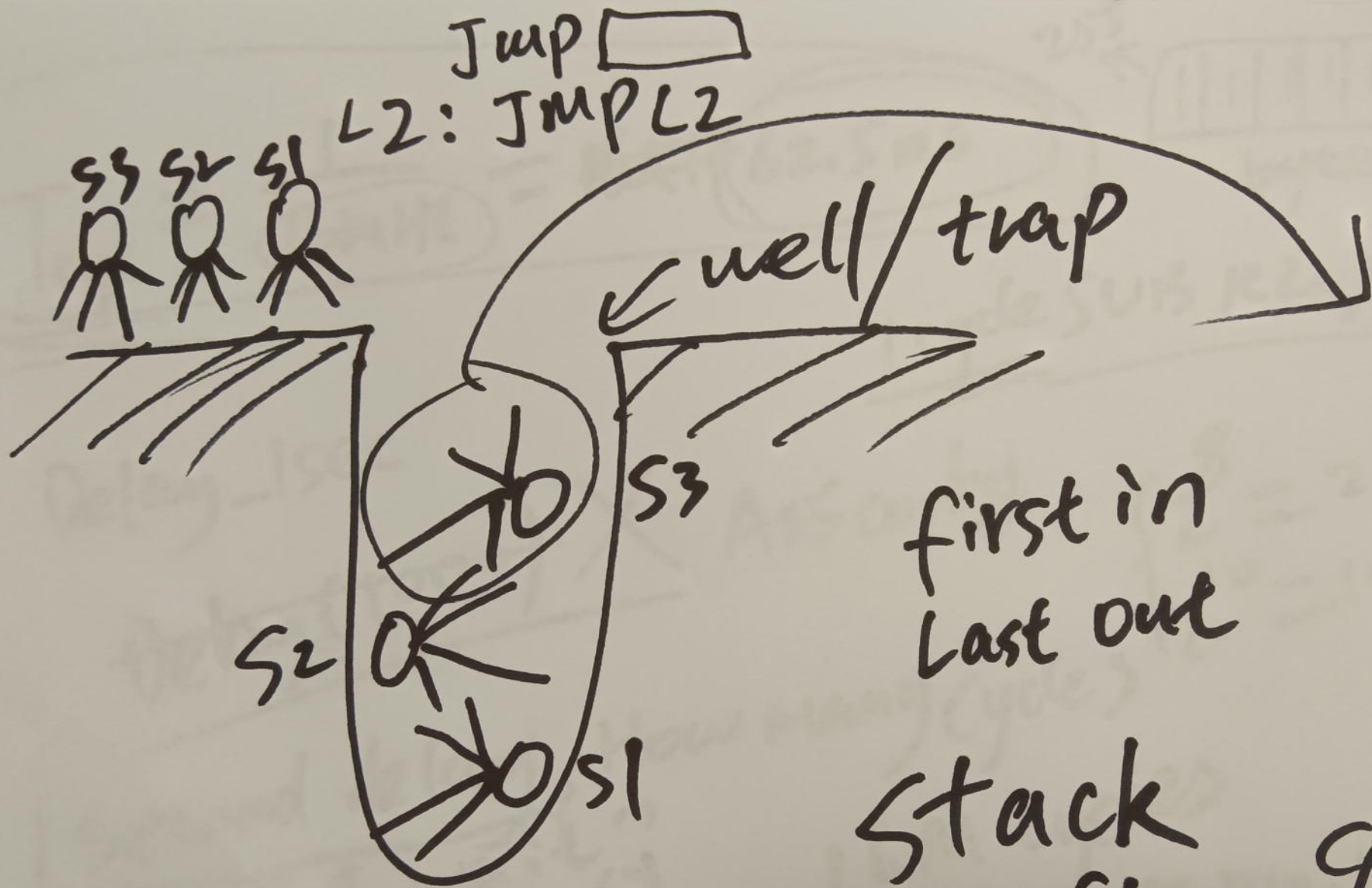
ADD R13, R11

ADD R11,

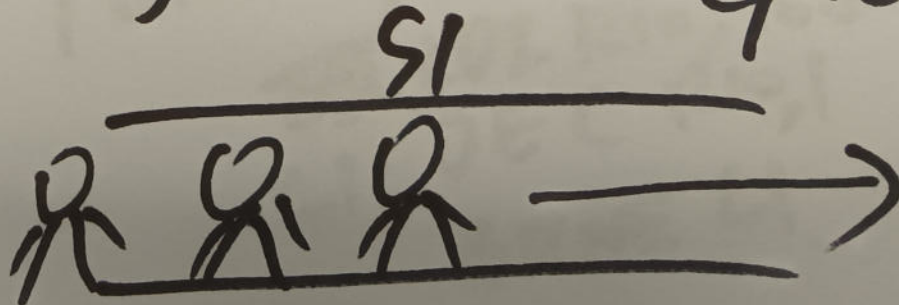
SUB ,

~~BRCS OR BRCC~~

BRCS L2
↓
carry set

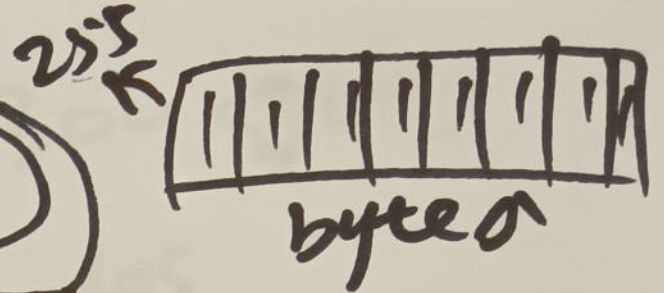


Stack



③

$$T_{\text{cyc}} = \frac{1}{16\text{MHz}} = 62.5\text{ns}$$



1 cycle SUB R20, R10

Delay - 1sec

~~Delay (1000) X Assembly~~

$$\begin{cases} 2^8 = 256 \\ 2^{10} = 1024 \end{cases}$$

1 second delay, How many cycles,
should I wait for
16M cycles

```
LDI R10, 16 * 10^6
LI: DEC R10, 1
BRNE LI
```

(4)

$$\underline{200} \times \underline{1.5 \text{ cycle}} = 300 \text{ cycles}$$

$$300 \times 300 = \underline{\underline{90000}} \text{ cycles}$$

$$\frac{16 \times 10^6}{90000} = \underline{\underline{177.8 \text{ cycles}}}$$

$$\frac{177.8}{1.5} = 119 \underline{\underline{\text{ loops}}}$$

(5)