* Suppose initial allowance is:

$$I^0 = (i_0^0 \; i_1^0 \; \cdots \; i_{n-1}^0)$$

* Possible solutions:

$$J_0 = (i^0_{max}, \cdots \; i^0_{max})$$

$$J_1 = (i^0_{max}+1, \cdots \; i^0_{max}+1)$$

$$\vdots$$

$$i^0_{max} = \max\{ i_0^0, \cdots \; i^0_{n-1} \}$$

* Solution:

$$J = \min_{i=0,1,\dots} DP(J_i)$$

$$DP(J_i^K, j) = \min \begin{cases} DP(J_i^{K-1}, 1) + 1 \\ DP(J_i^{K-1}, 2) + 1 \\ DP(J_i^{K-1}, 5) + 1 \end{cases}$$

$$DP(I^0, j) = 0$$

$$DP((j_0^{i,k}, \dots j_{n-1}^{i,k}), \ell) = \infty \text{ if}$$

for some $j_m^{i,k} < i_m^0$

For example:

$I^0 = (3, 8, 8, 1)$

$(8, 8, 8, 8)$

$(9, 9, 9, 9)$

$\vdots$

$8\ 8\ 8\ 8 \xrightarrow{-1} (7, 7, 7, 7)$

- $8, 7^{\infty}, 7, 7$
- $7, 8^{\infty}, 7, 7$
- $7^{\infty}, 7, 8, 7$
- $7, 7, 7, 8$

$8\ 8\ 8\ 8 \xrightarrow{-2} (5, 5, 5, 5)^{\infty}$

$8\ 8\ 8\ 8 \xrightarrow{-5} (3, 3, 3, 3)^{\infty}$

All are ∞ because all of them have a number < 8 in positions 1, 2

$9, 9, 9, 9 \xrightarrow{-1} 8\ 8\ 8\ 8$

- $9\ 8\ 8\ 8$
- $8\ 9\ 8\ 8$
- $8\ 8\ 9\ 8$
- $8\ 8\ 8\ 9$

$9, 9, 9, 9 \xrightarrow{-2} 7\ 7\ 7\ 7^{\infty}$

- $9\ 7\ 7\ 7$
- $7\ 9\ 7\ 7$
- $7\ 7\ 9\ 7$
- $7\ 7\ 7\ 9$

$9, 9, 9, 9 \xrightarrow{-5} \infty$

$$9\ 8\ 8\ 8 \xrightarrow{-1} 8\ 7\ 7\ 7$$

- 9 7 7 7
- 8 8 7 7
- 8 7 8 7
- 8 7 7 8

$$8\ 9\ 8\ 8 \xrightarrow{-1} 7\ 8\ 7\ 7$$

- 8 8 7 7
- 7 9 7 7
- 7 8 8 7
- 7 8 7 8

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