mcal[w] min # of calories for exactly w cents

not possible mcal[w] = \infty

desired mcal[w]
idea try all menu items \( v_1, v_2, \ldots, v_n \) cost \( c_1, c_2, \ldots, c_n \) calories

mcal[0] = 0

\[
\text{mcal}[w] = \min \left\{ \text{mcal}[w-v_i] + c_i \mid 1 \leq i \leq n \right\}
\]

save the item i which was the min

does the set is empty

useful structures
vectors 1..n for costs, calories, names from input

mcal[0..w] for calories for w
item[chosen \in 0..w] save the min i

boolean vectors
isPossible[w] is it possible to spend exactly w cents?
isVisited[w] has w been tested (for memoization)
iterative

for \( w = 1 \) to \( W \)

\[
\text{for } i = 1 \text{ to } n
\]
\[
\langle \text{check item } i \text{ against value } w \rangle
\]

\[\log^* n = \text{minimum s.t.} \quad \underbrace{\log \log \cdots \log}_{k \text{ times}} n \leq 1\]

\[\text{def} \quad n = \underbrace{2^{2^2}}_{k \text{ times}}\]

inverse

Ackermann's Function

primitive recursive functions

\[\text{LOOP } V \quad \text{\& do } V \text{ times based on init value of } V\]
When full, double

32 + k

k - 16

$3 - insert 3^{rd} item
- future copy to larger array
- copy at k - 16

deamortization