Iteration algorithm

input: $\mathbb{R}$-weighted graph $G = (V, E, \lambda)$ without negative weighted cycles

output: shortest-path matrix $D = (d_{u,v} \mid 1 \leq u, v \leq |V|)$

var: $\Delta = (\delta_{u,v} \mid 1 \leq u, v \leq |V|)$: $|V| \times |V|$-matrix;

```
1 begin
2     Δ := I;
3     for l:=1 to |V|-1 do Δ := multiply(Δ,W_G);
4     D := Δ
5 end
```

where $I = (i_{u,v} \mid 1 \leq u, v \leq |V|)$ with $i_{u,v} = \begin{cases} 0 & \text{if } u = v \\ \infty & \text{otherwise,} \end{cases}$

$W_G = (w_{u,v} \mid 1 \leq u, v \leq |V|)$ with $w_{u,v} = \begin{cases} 0 & \text{if } u = v \\ \infty & \text{if } u \neq v, (u,v) \notin E \\ \lambda(u,v) & \text{if } u \neq v, (u,v) \in E\,, \end{cases}$

and

FUNCTION multiply($E = (e_{u,v} \mid 1 \leq u, v \leq |V|)$, $F = (f_{u,v} \mid 1 \leq u, v \leq |V|)$: $|V| \times |V|$-matrices): $|V| \times |V|$-matrix;
var $H = (h_{u,v} \mid 1 \leq u, v \leq |V|)$: $|V| \times |V|$-matrix;
for u:=1 **to** $|V|$ **do**
  for v:=1 **to** $|V|$ **do**
    begin
      $h_{u,v} := \infty$;
      for t:=1 **to** $|V|$ **do** $h_{u,v} := min(h_{u,v}, e_{u,t} + f_{t,v})$
    end;
return H