Notation

- $G = (V, E)$: graph with nodes V, edges E and objects $V \cup E$
- R, C: integer intervals $R = [0, \#\text{rows})$ and $C = [0, \#\text{cols})$

Comments

```
// this is a comment
```

Defining Variables

define $x_{r,c,o}$
($\forall r \in R, \forall c \in C, \forall o \in V \cup E$)

```
def x(rows, cols, objects)
```

Iterating over Variables

$x_{r,0,v} = 1$ ($\forall v \in V, \forall r \in R$)

```
for v in nodes do
    for r in rows do
        x(r, 0, v) = 1
    end
end
```

two equivalent formulations

```
x(rows, 0, nodes) = 1
x(_, 0, nodes) = 1
```

Summation

$$\sum_{r \in R, e \in E} x_{r,0,e} \geq 1$$

```
sum x(_, 0, edges) >= 1
```

Restricting the Parameters

intervals for rows and columns

```
for r in [1..#rows − 2] do
    x(r, [0..3],_) = 0
end
```

properties of objects (in GML-file)

```
for s in nodes with label s do ···
for v in nodes without label s do ···
x(_,_, objects with color red) ···
```

graph structure

```
for v in nodes do
    x(_,_, neighbors of v) <= 0
    for e in incident edges of v do
        x(_,_, source of e) = 0
        x(_,_, target of e) = 0

        // neither source nor target:
        x(_,_, nodes without nodes e) = 1
    end
end
```

combination

```
···
x(_,_, neighbors of v with color red)
```