

# Teoría de Autómatas y Lenguajes Formales

## Actividad 1 - Práctica 1

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## Ejercicio 1

Halla la potencia  $R^3$  de la relación  $R = \{(1, 1), (1, 2), (2, 3), (3, 4)\}$ .

Sabemos que  $R \subseteq A \times A$  y para  $n > 1$ ;  $R^n = \{(a, b) : \exists x \in A, (a, x) \in R^{n-1} \wedge (x, b) \in R\}$ .

Aplicando la teoría obtenemos:

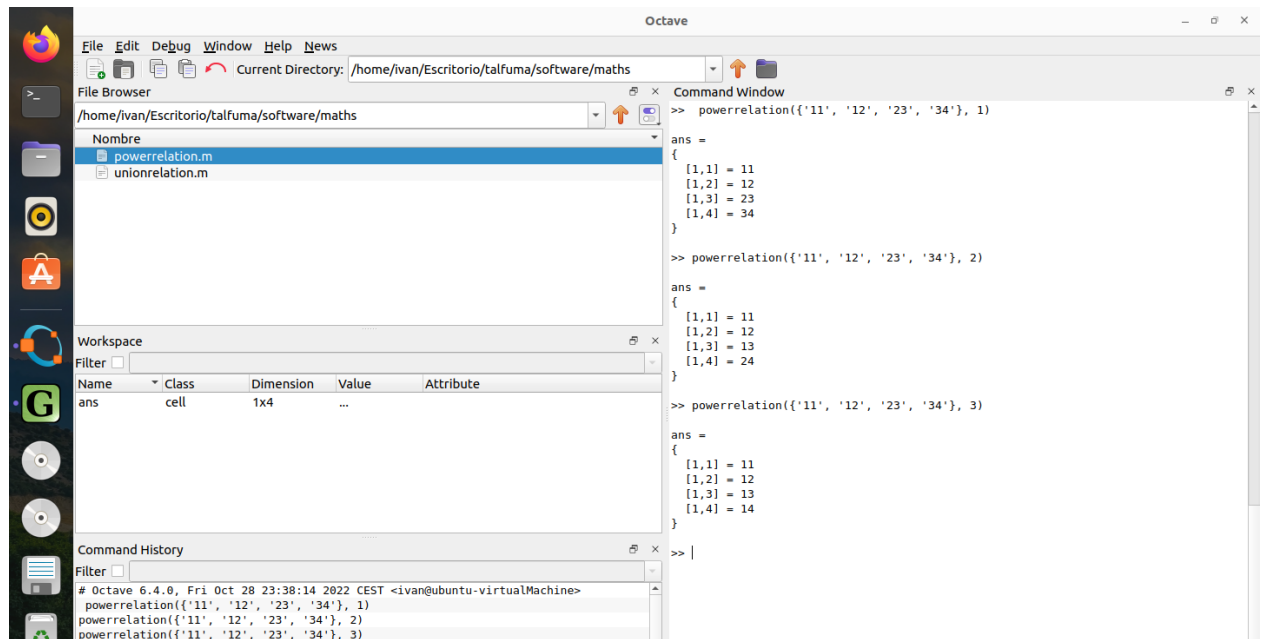
■  $R^2 = \{(1, 1), (1, 2), (1, 3), (2, 4)\}$  debido a que:

- $(1, 1) = (1, x) \in R \wedge (x, 1) \in R : \exists x = 1$ .
- $(1, 2) = (1, x) \in R \wedge (x, 2) \in R : \exists x = 1$ .
- $(1, 3) = (1, x) \in R \wedge (x, 3) \in R : \exists x = 2$ .
- $(2, 4) = (2, x) \in R \wedge (x, 4) \in R : \exists x = 3$ .

■  $R^3 = \{(1, 1), (1, 2), (1, 3), (1, 4)\}$  ya que:

- $(1, 1) = (1, x) \in R^2 \wedge (x, 1) \in R : \exists x = 1$ .
- $(1, 2) = (1, x) \in R^2 \wedge (x, 2) \in R : \exists x = 1$ .
- $(1, 3) = (1, x) \in R^2 \wedge (x, 3) \in R : \exists x = 2$ .
- $(1, 4) = (1, x) \in R^2 \wedge (x, 4) \in R : \exists x = 3$ .

Comprobamos la solución con el script powerrelation.m:



```
Octave
File Edit Debug Window Help News
Current Directory: /home/ivan/Escritorio/talfuma/software/maths
File Browser
/home/ivan/Escritorio/talfuma/software/maths
Nombre
powerrelation.m
unionrelation.m
Workspace
Filter
Name Class Dimension Value Attribute
ans cell 1x4 ...
Command History
Filter
# Octave 6.4.0, Fri Oct 28 23:38:14 2022 CEST <ivan@ubuntu-virtualMachine>
powerrelation({'11', '12', '23', '34'}, 1)
powerrelation({'11', '12', '23', '34'}, 2)
powerrelation({'11', '12', '23', '34'}, 3)
```

```
>> powerrelation({'11', '12', '23', '34'}, 1)
ans =
{
  [1,1] = 11
  [1,2] = 12
  [1,3] = 23
  [1,4] = 34
}

>> powerrelation({'11', '12', '23', '34'}, 2)
ans =
{
  [1,1] = 11
  [1,2] = 12
  [1,3] = 13
  [1,4] = 24
}

>> powerrelation({'11', '12', '23', '34'}, 3)
ans =
{
  [1,1] = 11
  [1,2] = 12
  [1,3] = 13
  [1,4] = 14
}
```