

INF-354-1P-P7

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1 Pimer Parcial de Inteligencia Artificial

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1.0.2 Pregunta 7. Con el uso de librerías en PYTHON, construya la dependencia de Abuelos, tíos, padres, primos e hijos de su familia.

Importamos la libreria Kanren de Python, Kanren permite la expresión de relaciones y la búsqueda de valores que las satisfagan. Importamos var que hara referencia a una variable, run se utiliza para ejecutar una consulta en el contexto de la programacion logica, Relation para establecer relaciones logicas entre terminos logicos, facts se utiliza para agregar hechos o afirmaciones a la base de conocimientos.

```
[ ]: #importamos los modulos var, run, relation y facts de la libreria kanren  
from kanren import var, run, Relation, facts
```

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[ ]: #x sera nuestra variable  
x = var()  
#definimos la relacion padre  
padre = Relation()  
facts(padre, ("Bartolome", "Tomas"),  
        ("Bartolome", "Luisa"),  
        ("Bartolome", "Nelly"),  
        ("Petrona", "Tomas"),  
        ("Petrona", "Luisa"),  
        ("Petrona", "Nelly"),  
        ("Pedro", "Basilio"),  
        ("Pedro", "Ramon"),  
        ("Pedro", "Carlos"),  
        ("Isidora", "Basilio"),  
        ("Isidora", "Ramon"),  
        ("Isidora", "Carlos"),  
        ("Basilio", "Steve"),  
        ("Basilio", "Richard"),  
        ("Basilio", "Ronald"),  
        ("Basilio", "Elmer"),  
        ("Basilio", "Wilmer"),  
        ("Basilio", "Julio"),  
        ("Basilio", "Cinthia"),
```

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        ("Basilio", "Fanny"),
        ("Basilio", "Maritza"),
        ("Tomas", "Steve"),
        ("Tomas", "Richard"),
        ("Tomas", "Ronald"),
        ("Tomas", "Elmer"),
        ("Tomas", "Wilmer"),
        ("Tomas", "Julio"),
        ("Tomas", "Cinthia"),
        ("Tomas", "Fanny"),
        ("Tomas", "Maritza"),
        ("Reynaldo", "Damariz"),
        ("Reynaldo", "Luis"),
        ("Reynaldo", "Miguel"),
        ("Nelly", "Damariz"),
        ("Nelly", "Luis"),
        ("Nelly", "Miguel"),
        ("Jaime", "Geovana"),
        ("Luisa", "Geovana"),
        ("Ramon", "Wilson"),
        ("Ramon", "Victor"),
        ("Ramon", "Ismael"),
        ("Germana", "Wilson"),
        ("Germana", "Victor"),
        ("Germana", "Ismael"),
        ("Carlos", "Miguel"),
        ("Carlos", "Luz"),
        ("Martha", "Miguel"),
        ("Martha", "Luz")
    )
#definimos la relacion abuelo
abuelo = Relation()
facts(abuelo, ("Bartolome", "Damariz"),
        ("Bartolome", "Luis"),
        ("Bartolome", "Miguel"),
        ("Bartolome", "Geovana"),
        ("Bartolome", "Steve"),
        ("Bartolome", "Richard"),
        ("Bartolome", "Ronald"),
        ("Bartolome", "Wilmer"),
        ("Bartolome", "Elmer"),
        ("Bartolome", "Julio"),
        ("Bartolome", "Cinthia"),
        ("Bartolome", "Maritza"),
        ("Bartolome", "Fanny"),
        ("Petrona", "Damariz"),
        ("Petrona", "Luis"),

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        ("Petrona", "Miguel"),
        ("Petrona", "Geovana"),
        ("Petrona", "Steve"),
        ("Petrona", "Richard"),
        ("Petrona", "Ronald"),
        ("Petrona", "Wilmer"),
        ("Petrona", "Elmer"),
        ("Petrona", "Julio"),
        ("Petrona", "Cinthia"),
        ("Petrona", "Maritza"),
        ("Petrona", "Fanny"),
        ("Pedro", "Steve"),
        ("Pedro", "Richard"),
        ("Pedro", "Ronald"),
        ("Pedro", "Wilmer"),
        ("Pedro", "Elmer"),
        ("Pedro", "Julio"),
        ("Pedro", "Cinthia"),
        ("Pedro", "Maritza"),
        ("Pedro", "Fanny"),
        ("Pedro", "Wilson"),
        ("Pedro", "Victor"),
        ("Pedro", "Ismael"),
        ("Pedro", "Miguel"),
        ("Pedro", "Luz"),
        ("Isidora", "Steve"),
        ("Isidora", "Richard"),
        ("Isidora", "Ronald"),
        ("Isidora", "Wilmer"),
        ("Isidora", "Elmer"),
        ("Isidora", "Julio"),
        ("Isidora", "Cinthia"),
        ("Isidora", "Maritza"),
        ("Isidora", "Fanny"),
        ("Isidora", "Wilson"),
        ("Isidora", "Victor"),
        ("Isidora", "Ismael"),
        ("Isidora", "Miguel"),
        ("Isidora", "Luz")
    )
#definimos la relacion tio
tio = Relation()
facts(tio,    ("Nelly", "Steve"),
              ("Nelly", "Richard"),
              ("Nelly", "Ronald"),
              ("Nelly", "Wilmer"),
              ("Nelly", "Elmer"),

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("Nelly", "Julio"),
("Nelly", "Cinthia"),
("Nelly", "Maritza"),
("Nelly", "Fanny"),
("Nelly", "Geovana"),
("Reynaldo", "Steve"),
("Reynaldo", "Richard"),
("Reynaldo", "Ronald"),
("Reynaldo", "Wilmer"),
("Reynaldo", "Elmer"),
("Reynaldo", "Julio"),
("Reynaldo", "Cinthia"),
("Reynaldo", "Maritza"),
("Reynaldo", "Fanny"),
("Reynaldo", "Geovana"),
("Luisa", "Steve"),
("Luisa", "Richard"),
("Luisa", "Ronald"),
("Luisa", "Wilmer"),
("Luisa", "Elmer"),
("Luisa", "Julio"),
("Luisa", "Cinthia"),
("Luisa", "Maritza"),
("Luisa", "Fanny"),
("Luisa", "Miguel"),
("Luisa", "Luis"),
("Luisa", "Damariz"),
("Jaime", "Steve"),
("Jaime", "Richard"),
("Jaime", "Ronald"),
("Jaime", "Wilmer"),
("Jaime", "Elmer"),
("Jaime", "Julio"),
("Jaime", "Cinthia"),
("Jaime", "Maritza"),
("Jaime", "Fanny"),
("Jaime", "Miguel"),
("Jaime", "Luis"),
("Jaime", "Damariz"),
("Basilio", "Miguel"),
("Basilio", "Luis"),
("Basilio", "Damariz"),
("Basilio", "Geovana"),
("Tomas", "Miguel"),
("Tomas", "Luis"),
("Tomas", "Damariz"),
("Tomas", "Geovana"),

("Carlos", "Steve"),
("Carlos", "Richard"),
("Carlos", "Ronald"),
("Carlos", "Wilmer"),
("Carlos", "Elmer"),
("Carlos", "Julio"),
("Carlos", "Cinthia"),
("Carlos", "Maritza"),
("Carlos", "Fanny"),
("Carlos", "Wilson"),
("Carlos", "Victor"),
("Carlos", "Ismael"),
("Martha", "Steve"),
("Martha", "Richard"),
("Martha", "Ronald"),
("Martha", "Wilmer"),
("Martha", "Elmer"),
("Martha", "Julio"),
("Martha", "Cinthia"),
("Martha", "Maritza"),
("Martha", "Fanny"),
("Martha", "Wilson"),
("Martha", "Victor"),
("Martha", "Ismael"),
("Ramon", "Steve"),
("Ramon", "Richard"),
("Ramon", "Ronald"),
("Ramon", "Wilmer"),
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("Ramon", "Maritza"),
("Ramon", "Fanny"),
("Ramon", "Miguel"),
("Ramon", "Luz"),
("Germana", "Steve"),
("Germana", "Richard"),
("Germana", "Ronald"),
("Germana", "Wilmer"),
("Germana", "Elmer"),
("Germana", "Julio"),
("Germana", "Cinthia"),
("Germana", "Maritza"),
("Germana", "Fanny"),
("Germana", "Miguel"),
("Germana", "Luz"),
("Basilio", "Wilson"),

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        ("Basilio", "Victor"),
        ("Basilio", "Ismael"),
        ("Basilio", "Miguel"),
        ("Basilio", "Luz"),
        ("Tomasa", "Wilson"),
        ("Tomasa", "Victor"),
        ("Tomasa", "Ismael"),
        ("Tomasa", "Miguel"),
        ("Tomasa", "Luz"),
    )
#definimos la relacion primo
primo = Relation()
facts(primo, ("Damariz", "Steve"),
        ("Damariz", "Richard"),
        ("Damariz", "Ronald"),
        ("Damariz", "Wilmer"),
        ("Damariz", "Elmer"),
        ("Damariz", "Julio"),
        ("Damariz", "Cinthia"),
        ("Damariz", "Maritza"),
        ("Damariz", "Fanny"),
        ("Damariz", "Geovana"),
        ("Luis", "Steve"),
        ("Luis", "Richard"),
        ("Luis", "Ronald"),
        ("Luis", "Wilmer"),
        ("Luis", "Elmer"),
        ("Luis", "Julio"),
        ("Luis", "Cinthia"),
        ("Luis", "Maritza"),
        ("Luis", "Fanny"),
        ("Luis", "Geovana"),
        ("Miguel", "Steve"),
        ("Miguel", "Richard"),
        ("Miguel", "Ronald"),
        ("Miguel", "Wilmer"),
        ("Miguel", "Elmer"),
        ("Miguel", "Julio"),
        ("Miguel", "Cinthia"),
        ("Miguel", "Maritza"),
        ("Miguel", "Fanny"),
        ("Miguel", "Geovana"),
        ("Geovana", "Steve"),
        ("Geovana", "Richard"),
        ("Geovana", "Ronald"),
        ("Geovana", "Wilmer"),
        ("Geovana", "Elmer"),

```

("Geovana", "Julio"),
("Geovana", "Cinthia"),
("Geovana", "Maritza"),
("Geovana", "Fanny"),
("Geovana", "Miguel"),
("Geovana", "Luis"),
("Geovana", "Damariz"),
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("Steve", "Luis"),
("Steve", "Geovana"),
("Richard", "Damariz"),
("Richard", "Miguel"),
("Richard", "Luis"),
("Richard", "Geovana"),
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("Ronald", "Miguel"),
("Ronald", "Luis"),
("Ronald", "Geovana"),
("Wilmer", "Damariz"),
("Wilmer", "Miguel"),
("Wilmer", "Luis"),
("Wilmer", "Geovana"),
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("Julio", "Miguel"),
("Julio", "Luis"),
("Julio", "Geovana"),
("Elmer", "Damariz"),
("Elmer", "Miguel"),
("Elmer", "Luis"),
("Elmer", "Geovana"),
("Cinthia", "Damariz"),
("Cinthia", "Miguel"),
("Cinthia", "Luis"),
("Cinthia", "Geovana"),
("Maritza", "Damariz"),
("Maritza", "Miguel"),
("Maritza", "Luis"),
("Maritza", "Geovana"),
("Fanny", "Damariz"),
("Fanny", "Miguel"),
("Fanny", "Luis"),
("Fanny", "Geovana"),
("Wilson", "Steve"),
("Wilson", "Richard"),
("Wilson", "Ronald"),
("Wilson", "Wilmer"),

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("Wilson", "Elmer"),
("Wilson", "Julio"),
("Wilson", "Cinthia"),
("Wilson", "Maritza"),
("Wilson", "Fanny"),
("Wilson", "Miguel"),
("Wilson", "Luz"),
("Victor", "Steve"),
("Victor", "Richard"),
("Victor", "Ronald"),
("Victor", "Wilmer"),
("Victor", "Elmer"),
("Victor", "Julio"),
("Victor", "Cinthia"),
("Victor", "Maritza"),
("Victor", "Fanny"),
("Victor", "Miguel"),
("Victor", "Luz"),
("Ismael", "Steve"),
("Ismael", "Richard"),
("Ismael", "Ronald"),
("Ismael", "Wilmer"),
("Ismael", "Elmer"),
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("Ismael", "Cinthia"),
("Ismael", "Maritza"),
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("Ismael", "Miguel"),
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("Miguel", "Steve"),
("Miguel", "Richard"),
("Miguel", "Ronald"),
("Miguel", "Wilmer"),
("Miguel", "Elmer"),
("Miguel", "Julio"),
("Miguel", "Cinthia"),
("Miguel", "Maritza"),
("Miguel", "Fanny"),
("Miguel", "Wilson"),
("Miguel", "Victor"),
("Miguel", "Ismael"),
("Luz", "Steve"),
("Luz", "Richard"),
("Luz", "Ronald"),
("Luz", "Wilmer"),
("Luz", "Elmer"),
("Luz", "Julio"),
```



```
("Luz", "Cinthia"),
("Luz", "Maritza"),
("Luz", "Fanny"),
("Luz", "Wilson"),
("Luz", "Victor"),
("Luz", "Ismael"),
("Steve", "Wilson"),
("Steve", "Victor"),
("Steve", "Ismael"),
("Steve", "Luz"),
("Steve", "Miguel"),
("Richard", "Wilson"),
("Richard", "Victor"),
("Richard", "Ismael"),
("Richard", "Luz"),
("Richard", "Miguel"),
("Ronald", "Wilson"),
("Ronald", "Victor"),
("Ronald", "Ismael"),
("Ronald", "Luz"),
("Ronald", "Miguel"),
("Wilmer", "Wilson"),
("Wilmer", "Victor"),
("Wilmer", "Ismael"),
("Wilmer", "Luz"),
("Wilmer", "Miguel"),
("Julio", "Wilson"),
("Julio", "Victor"),
("Julio", "Ismael"),
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("Julio", "Miguel"),
("Elmer", "Wilson"),
("Elmer", "Victor"),
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("Elmer", "Luz"),
("Elmer", "Miguel"),
("Cinthia", "Wilson"),
("Cinthia", "Victor"),
("Cinthia", "Ismael"),
("Cinthia", "Luz"),
("Cinthia", "Miguel"),
("Maritza", "Wilson"),
("Maritza", "Victor"),
("Maritza", "Ismael"),
("Maritza", "Luz"),
("Maritza", "Miguel"),
("Fanny", "Wilson"),
```

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        ("Fanny", "Victor"),
        ("Fanny", "Ismael"),
        ("Fanny", "Luz"),
        ("Fanny", "Miguel"),
    )
#definimos la relacion hijo
hijo = Relation()
facts(hijo, ("Damariz", "Nelly"),
        ("Luis", "Nelly"),
        ("Miguel", "Nelly"),
        ("Damariz", "Reynaldo"),
        ("Luis", "Reynaldo"),
        ("Miguel", "Reynaldo"),
        ("Geovana", "Luisa"),
        ("Geovana", "Jaime"),
        ("Steve", "Basilio"),
        ("Richard", "Basilio"),
        ("Ronald", "Basilio"),
        ("Wilmer", "Basilio"),
        ("Julio", "Basilio"),
        ("Elmer", "Basilio"),
        ("Cinthia", "Basilio"),
        ("Maritza", "Basilio"),
        ("Fanny", "Basilio"),
        ("Steve", "Tomasa"),
        ("Richard", "Tomasa"),
        ("Ronald", "Tomasa"),
        ("Wilmer", "Tomasa"),
        ("Julio", "Tomasa"),
        ("Elmer", "Tomasa"),
        ("Cinthia", "Tomasa"),
        ("Maritza", "Tomasa"),
        ("Fanny", "Tomasa"),
        ("Wilson", "Ramon"),
        ("Victor", "Ramon"),
        ("Ismael", "Ramon"),
        ("Wilson", "Germana"),
        ("Victor", "Germana"),
        ("Ismael", "Germana"),
        ("Miguel", "Carlos"),
        ("Luz", "Carlos"),
        ("Miguel", "Martha"),
        ("Luz", "Martha")
    )

hermano = Relation()
facts(hermano, ("Damariz", "Luis"),

```

("Damariz", "Miguel"),
("Luis", "Damariz"),
("Luis", "Miguel"),
("Miguel", "Luis"),
("Miguel", "Damariz"),
("Steve", "Richard"),
("Steve", "Ronald"),
("Steve", "Wilmer"),
("Steve", "Julio"),
("Steve", "Elmer"),
("Steve", "Fanny"),
("Steve", "Maritza"),
("Steve", "Cinthia"),
("Richard", "Steve"),
("Richard", "Ronald"),
("Richard", "Wilmer"),
("Richard", "Julio"),
("Richard", "Elmer"),
("Richard", "Fanny"),
("Richard", "Maritza"),
("Richard", "Cinthia"),
("Ronald", "Richard"),
("Ronald", "Steve"),
("Ronald", "Wilmer"),
("Ronald", "Julio"),
("Ronald", "Elmer"),
("Ronald", "Fanny"),
("Ronald", "Maritza"),
("Ronald", "Cinthia"),
("Wilmer", "Richard"),
("Wilmer", "Ronald"),
("Wilmer", "Steve"),
("Wilmer", "Julio"),
("Wilmer", "Elmer"),
("Wilmer", "Fanny"),
("Wilmer", "Maritza"),
("Wilmer", "Cinthia"),
("Julio", "Richard"),
("Julio", "Ronald"),
("Julio", "Wilmer"),
("Julio", "Steve"),
("Julio", "Elmer"),
("Julio", "Fanny"),
("Julio", "Maritza"),
("Julio", "Cinthia"),
("Elmer", "Richard"),
("Elmer", "Ronald"),

("Elmer", "Wilmer"),
("Elmer", "Julio"),
("Elmer", "Steve"),
("Elmer", "Fanny"),
("Elmer", "Maritza"),
("Elmer", "Cinthia"),
("Fanny", "Richard"),
("Fanny", "Ronald"),
("Fanny", "Wilmer"),
("Fanny", "Julio"),
("Fanny", "Elmer"),
("Fanny", "Steve"),
("Fanny", "Maritza"),
("Fanny", "Cinthia"),
("Maritza", "Richard"),
("Maritza", "Ronald"),
("Maritza", "Wilmer"),
("Maritza", "Julio"),
("Maritza", "Elmer"),
("Maritza", "Fanny"),
("Maritza", "Steve"),
("Maritza", "Cinthia"),
("Cinthia", "Richard"),
("Cinthia", "Ronald"),
("Cinthia", "Wilmer"),
("Cinthia", "Julio"),
("Cinthia", "Elmer"),
("Cinthia", "Fanny"),
("Cinthia", "Maritza"),
("Cinthia", "Steve"),
("Wilson", "Victor"),
("Wilson", "Ismael"),
("Victor", "Wilson"),
("Victor", "Ismael"),
("Ismael", "Victor"),
("Ismael", "Wilson"),
("Miguel", "Luz"),
("Luz", "Miguel"),
("Tomas", "Luisa"),
("Tomas", "Nelly"),
("Luisa", "Tomas"),
("Luisa", "Nelly"),
("Nelly", "Luisa"),
("Nelly", "Tomas"),
("Basilio", "Carlos"),
("Basilio", "Ramon"),
("Carlos", "Basilio"),

```

        ("Carlos", "Ramon"),
        ("Ramon", "Carlos"),
        ("Ramon", "Basilio"),
    )

```

Una vez construida la base de conocimientos procederemos a realizar algunas consultas

```

[ ]: #Realizamos las consultas
print("Mostraremos los abuelos de Steve")
print(run(0, x, abuelo(x, "Steve")))
print("Mostraremos los tios de Julio")
print(run(0, x, tio(x, "Julio")))
print("Mostraremos los hijos de Basilio")
print(run(0, x, padre(x, "Basilio")))
print("Mostraremos los primos de Damariz")
print(run(0, x, primo(x, "Damariz")))
print("Mostraremos los primos de Luz")
print(run(0, x, primo(x, "Luz")))
print("Mostraremos los tios de Geovana")
print(run(0, x, tio(x, "Geovana")))
print("Mostraremos los tios de Wilson")
print(run(0, x, tio(x, "Wilson")))
print("Mostraremos los abuelos de Luz")
print(run(0, x, abuelo(x, "Luz")))
print("Mostraremos los abuelos de Luis")
print(run(0, x, abuelo(x, "Luis")))
print("Mostraremos los nietos de Bartolome")
print(run(0, x, abuelo("Bartolome", x)))
print("Mostraremos los nietos de Isidora")
print(run(0, x, abuelo("Isidora", x)))
print("Mostraremos los sobrinos de Carlos")
print(run(0, x, tio("Carlos", x)))
print("Mostraremos los sobrinos de Luisa")
print(run(0, x, tio("Luisa", x)))
print("Mostraremos los hermanos de Steve")
print(run(0, x, hermano(x, "Steve")))
print("Mostraremos los hermanos de Tomasa")
print(run(0, x, hermano(x, "Tomasa")))

```

```

Mostraremos los abuelos de Steve
('Bartolome', 'Isidora', 'Petrona', 'Pedro')
Mostraremos los tios de Julio
('Germana', 'Luisa', 'Martha', 'Nelly', 'Jaime', 'Reynaldo', 'Carlos', 'Ramon')
Mostraremos los hijos de Basilio
('Pedro', 'Isidora')
Mostraremos los primos de Damariz
('Maritza', 'Elmer', 'Geovana', 'Steve', 'Fanny', 'Julio', 'Richard', 'Cinthia',
'Wilmer', 'Ronald')

```

Mostraremos los primos de Luz
('Wilson', 'Wilmer', 'Ismael', 'Richard', 'Victor', 'Julio', 'Cinthia', 'Elmer',
'Ronald', 'Maritza', 'Fanny', 'Steve')
Mostraremos los tios de Geovana
('Nelly', 'Tomas', 'Reynaldo', 'Basilio')
Mostraremos los tios de Wilson
('Tomas', 'Basilio', 'Martha', 'Carlos')
Mostraremos los abuelos de Luz
('Isidora', 'Pedro')
Mostraremos los abuelos de Luis
('Petrona', 'Bartolome')
Mostraremos los nietos de Bartolome
('Cinthia', 'Ronald', 'Richard', 'Steve', 'Wilmer', 'Geovana', 'Maritza',
'Damariz', 'Miguel', 'Fanny', 'Julio', 'Luis', 'Elmer')
Mostraremos los nietos de Isidora
('Elmer', 'Cinthia', 'Wilson', 'Ronald', 'Richard', 'Steve', 'Wilmer', 'Luz',
'Fanny', 'Julio', 'Maritza', 'Ismael', 'Miguel', 'Victor')
Mostraremos los sobrinos de Carlos
('Elmer', 'Richard', 'Wilson', 'Wilmer', 'Steve', 'Ismael', 'Fanny', 'Julio',
'Maritza', 'Victor', 'Cinthia', 'Ronald')
Mostraremos los sobrinos de Luisa
('Steve', 'Miguel', 'Fanny', 'Julio', 'Maritza', 'Damariz', 'Cinthia', 'Ronald',
'Luis', 'Elmer', 'Richard', 'Wilmer')
Mostraremos los hermanos de Steve
('Julio', 'Richard', 'Cinthia', 'Wilmer', 'Elmer', 'Ronald', 'Maritza', 'Fanny')
Mostraremos los hermanos de Tomas
('Luisa', 'Nelly')