

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt

def prog(r, n, a1):
    an = a1 + r*(n-1)
    seq = np.arange(start=a1, stop=an, step=r)
    return seq

prog(r=7, n=20, a1=15)

array([ 15,  22,  29,  36,  43,  50,  57,  64,  71,  78,  85,  92,  99,
        106, 113, 120, 127, 134, 141])
```

Haz doble clic (o ingresa) para editar

```
np.random.seed(123)

df1 = pd.DataFrame({
    'de': np.sort(np.random.normal(loc = 4, scale = 1, size=96)),
    'dl': np.sort(np.random.normal(loc=4.5, scale=1.2, size=96)),
    'ddd': np.repeat(prog(r=7, n=25, a1=15), 4)
})

df1['localidad'] = np.repeat(['l1','l2']*24, 2)
df1
```



Asignación

- 1. Convertir en coordenadas polares los datos de de y dl
- 2. Graficar un cardioide en coordenadas polares en Python

```
df1['r']=np.sqrt((df1['de']**2)+(df1['dl']**2))
df1['theta']=np.arctan((df1['dl'])/(df1['de']))
df1
```

```
plt.axes(projection = 'polar')

a=4

rads = np.arange(0,(3 * np.pi), 0.01)

for rad in rads:
    r = a + (a*np.cos(rad))
    plt.polar(rad,r,'g.')

plt.show()
```