Cell 01

```
import sympy
t, K ,r, P0, C1 = sympy.symbols('t, K, r, P_0, C_1')
P = sympy.Function('P')
edo = P(t).diff(t) - r * P(t) * (1 - P(t)/K)
edo
```

$$-r\left(1-\frac{P(t)}{K}\right)P(t)+\frac{d}{dt}P(t)$$

Cell 02

```
edo_sol = sympy.dsolve(edo, P(t))
edo_sol
```

$$P(t)=\frac{Ke^{C_1K+rt}}{e^{C_1K+rt}-1}$$

Cell 03

```
ini_cond = {P(0): P0}
ini_cond
```

```
{P(0): P_0}
```

Cell 04

```
C_eq = edo_sol.subs(t,0).subs(ini_cond)
C_eq
```

$$P_0=\frac{Ke^{C_1K}}{e^{C_1K}-1}$$

Cell 05

```
import matplotlib.pyplot as plt
import numpy as np
def logistica(t, P0=100, K=1000, r=0.25):
    A = P0 / (P0 - K)
    return K / (1 - np.exp(-r*t) / A)
```

Cell 06

```
t = np.linspace(0, 40, 100)  # Intervalo de tiempo en que se obtiene la solución
p1 = plt.plot(t, logistica(t, P0 = 100), label=r'$P_0 = 100$')
p1 = plt.plot(t, logistica(t, P0 = 2000), label=r'$P_0 = 1500$')
plt.legend()
plt.show()
```