ACTIVIDAD 1

EDUARDO VARGAS SORIA

ECUACIONES LOTKA-VOLTERRA

- $\begin{cases} p'(t) = 0 \\ d'(t) = 0 \end{cases}$

$$\begin{cases} p'(t) = \alpha_1 p(t) - \alpha_2 p(t) d(t) \\ d'(t) = -\beta_1 d(t) + \beta_2 p(t) d(t) \end{cases}$$

$$p(0) = 30\,, d(0) = 4$$

$$\bar{p} = \frac{\beta_1}{\beta_2} \qquad \bar{d} = \frac{\alpha_1}{\alpha_2}$$

$$p(t) = p(0)e^{\alpha_1 t} \quad d(t) = d(0)e^{-\beta_1 t}$$

Año	Conejos	Linces	Año	Conejos	Linces
1900	30	4	1911	40.3	8
1901	47.2	6.1	1912	57	12.3
1902	70.2	9.8	1913	76.6	19.5
1903	77.4	35.2	1914	52.3	45.7
1904	36.3	59.4	1915	19.5	51.1
1905	20.6	41.7	1916	11.2	29.7
1906	18.1	19	1917	7.6	15.8
1907	21.4	13	1918	14.6	9.7
1908	22	8.3	1920	16.2	10.1
1909	25.4	9.1	1921	24.7	8.6
1910	27.1	7.4	1922	-	-

- $\begin{cases} p'(t) = 0 \\ d'(t) = 0 \end{cases}$

$$\begin{cases} p'(t) = \alpha_1 p(t) - \alpha_2 p(t) d(t) \\ d'(t) = -\beta_1 d(t) + \beta_2 p(t) d(t) \end{cases}$$

$$p(0) = 30\,, d(0) = 4$$

$$\bar{p} = \frac{\beta_1}{\beta_2} \qquad \bar{d} = \frac{\alpha_1}{\alpha_2}$$

$$p(t) = p(0)e^{\alpha_1 t} \qquad d(t) = d(0)e^{-\beta_1 t}$$

$$\begin{cases} \alpha_1 p(t) - \alpha_2 p(t) d(t) = 0 \\ -\beta_1 d(t) + \beta_2 p(t) d(t) = 0 \end{cases}$$

$$\alpha_1 p(t) = \alpha_2 p(t) d(t)$$

$$d(t) = \frac{\alpha_1}{\alpha_2}$$

$$p(t) = \frac{\beta_1}{\beta_2}$$

$$\bar{p} = 34.08$$

$$\bar{d} = 20.16$$

$$p(1) = 47.2 = p(0)e^{\alpha_1 t} = 30e^{\alpha_1 t}$$

$$\alpha_1 = \ln\left(\frac{47.2}{30}\right) \approx 0.45$$

$$d(1) = 6.1 = d(0)e^{\alpha_1 t} = 4e^{-\beta_1 t}$$

$$\beta_1 = -\ln\left(\frac{6.1}{4}\right) \approx -0.42$$

$$\alpha_2 = \frac{\alpha_1}{\bar{d}} \approx \frac{0.45}{20.16} \approx 0.022$$

$$\beta_2 = \frac{\beta_1}{\bar{p}} \approx \frac{-0.25}{34.08} - 0.007$$

$$p(t) \approx 30e^{0.45t}$$

$$d(t) \approx 4e^{0.42t}$$

$$(\mathbf{34.08}, \mathbf{20.16})$$