Conocer, reconocer, resolver problemas que involucran ecuaciones diferenciales

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resolver una ecuación diferencial.

obtener y conocer la forma de la función incógnita y la denominaremos función solución

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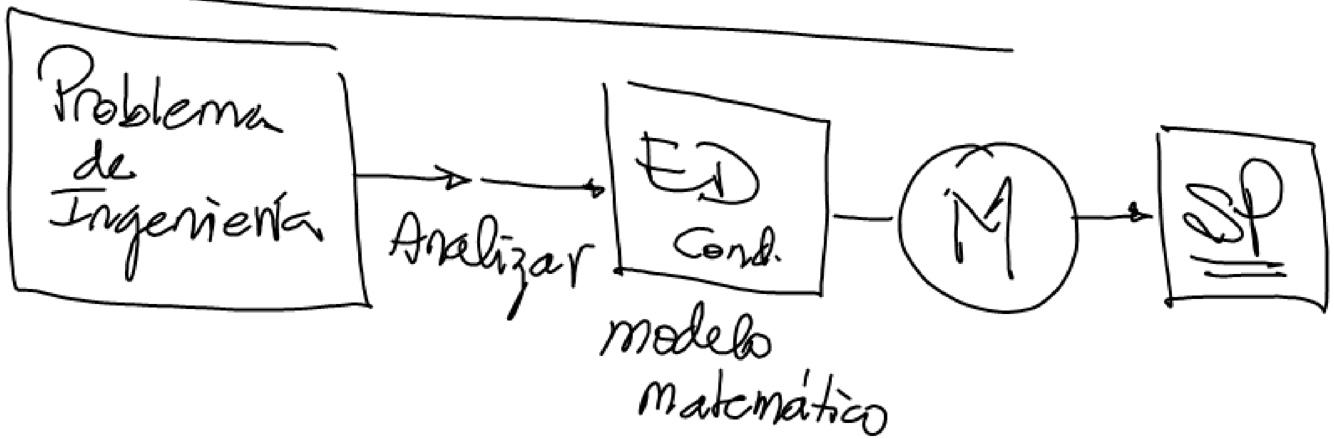
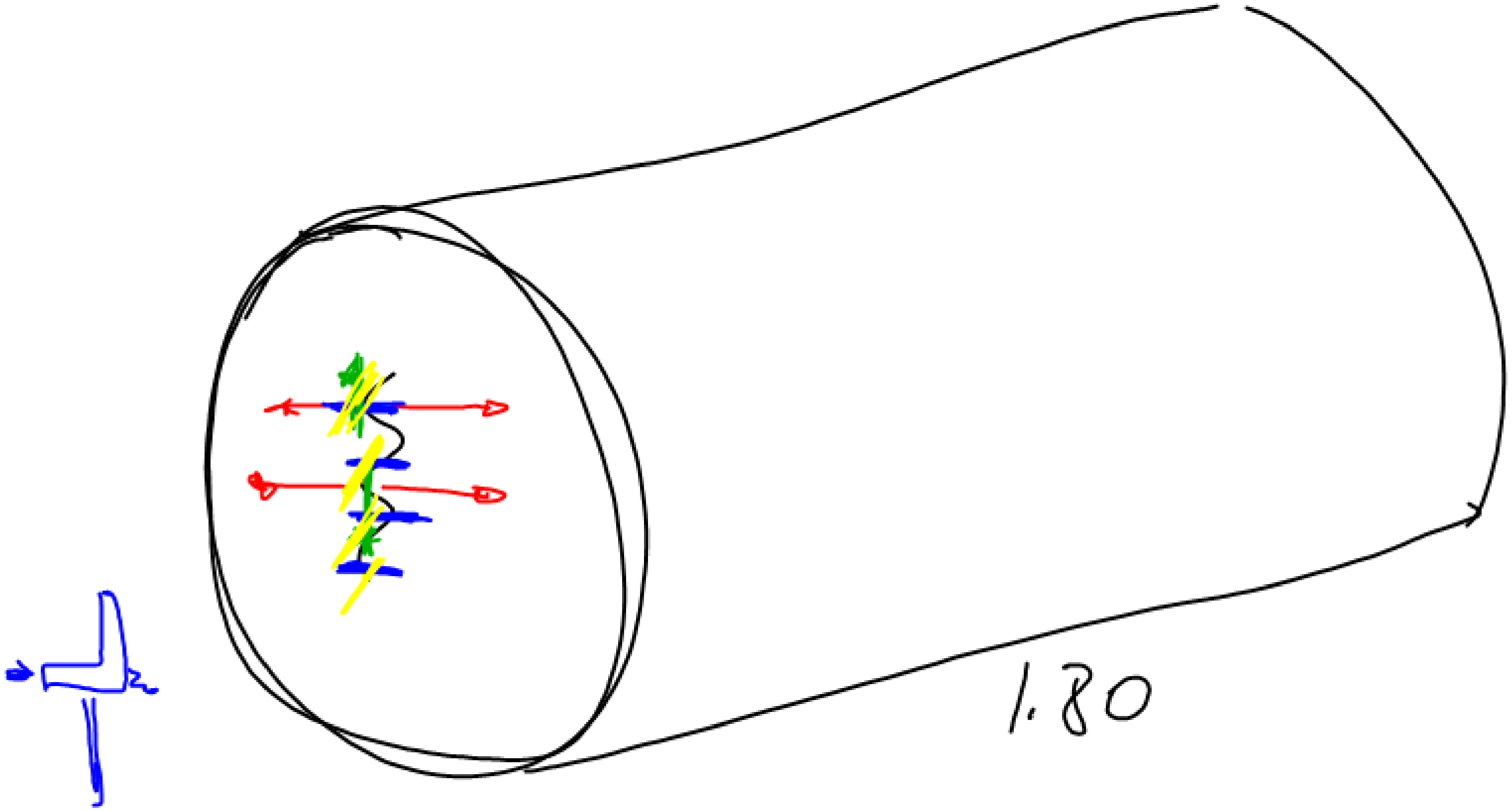
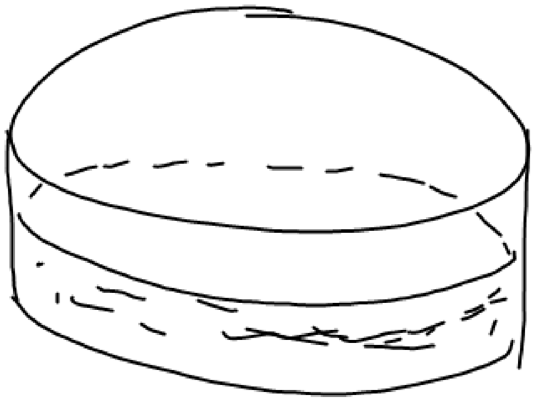



1.80

$$\frac{dP}{dt} \sim P$$

$P(0) = 1$

$P(5) = 1000$



$$\frac{d}{dt}P(t) = kP(t)$$

$$\frac{dP}{dt} - kP = 0$$

$$F\big(t, P(t), P'(t)\big) = 0$$

$$\frac{dP}{dt} = kP \qquad \left\{ \begin{array}{l} \dfrac{dP}{dt} \\ P'(t) \\ \dot{P} \\ D_t P \end{array} \right.$$

$$dP = kP\,dt$$

$$dP = P'(t)\,dt$$

$$\frac{dP}{P} = k\,dt$$

$$\int \frac{dP}{P} = k \int dt$$

$$\ln P + c_1 = k\left(t + c_2\right)$$

$$\ln P = kt + \left(kc_2 - c_1\right)$$

$$\ln P = kt + C_1$$

$$P(t) = e^{(kt + C_1)}$$

$$P(t) = e^{C_1} e^{kt}$$

$$\boxed{\frac{dP(t)}{dt} = kP(t)} \qquad \boxed{P(t) = C_{10} e^{kt}}$$

SOLUCIÓN GENERAL

$$P'(t) = kP(t) \qquad P(0) = 1$$
$$P(5) = 1000$$

$$P(t) = C_{10} e^{kt}$$

$$C_{10} e^{k(0)} = 1 \longrightarrow \boxed{C_{10} = 1}$$

$$P(t) = e^{kt}$$

$$e^{5k} = 1000$$

$$L e^{5k} = L(1000)$$

$$5k\, \cancel{Le}^{\,1} = L(1000)$$

$$5k = L(1000) \longrightarrow \boxed{k = \frac{L(1000)}{5}}$$

$$P'(t) = \frac{L(1000)}{5} P(t) \qquad \begin{aligned} y(0) &= 1 \\ y(5) &= 1000 \end{aligned}$$

$$\boxed{P(t) = e^{\frac{L(1000)}{5} t}}$$

SOLUCIÓN PARTICULA.

¿En cuántos días, la bacteria alcanzará una Población de 10,000?