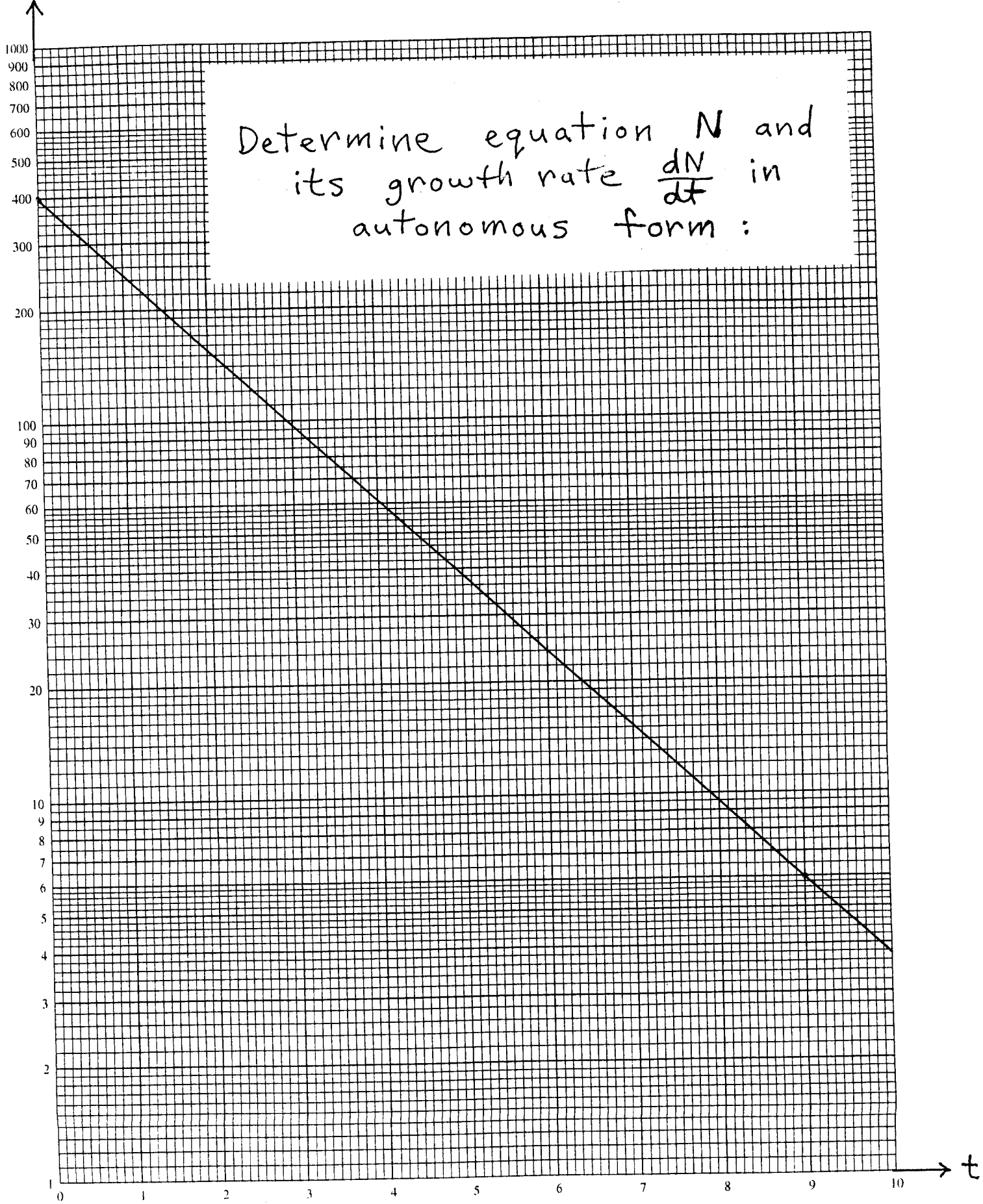


Problem B

$\log N$



Problem B Solution

Assume graph is a straight line:

$$Y = mt + b \rightarrow$$
$$\log N = mt + b ; \quad \boxed{b = \log 400} \rightarrow$$

$$\log N = mt + \log 400 ; \text{ use point}$$
$$t = 9, N = 6 \rightarrow$$

$$\log 6 = m \cdot (9) + \log 400 \rightarrow$$

$$9m = \log 6 - \log 400 \rightarrow$$

$$9m = \log\left(\frac{6}{400}\right) = \log\left(\frac{3}{200}\right) \rightarrow$$

$$\boxed{m = \frac{1}{9} \log\left(\frac{3}{200}\right)} ; \text{ then}$$

$$\log N = \frac{1}{9} \log\left(\frac{3}{200}\right) \cdot t + \log 400 \rightarrow$$

$$\log N = \frac{1}{9} t \cdot \log\left(\frac{3}{200}\right) + \log 400 \rightarrow$$

$$\log N = \log\left(\frac{3}{200}\right)^{\frac{1}{9}t} + \log 400 \rightarrow$$

$$\log N = \log\left[400 \cdot \left(\frac{3}{200}\right)^{\frac{1}{9}t}\right] \rightarrow$$

$$\log N = \log\left[400 \cdot \left(\frac{3}{200}\right)^{\frac{1}{9}t}\right] \rightarrow$$

$$\boxed{N = 400 \cdot \left(\frac{3}{200}\right)^{\frac{1}{9}t}} ; \quad \xrightarrow{D}$$

$$\frac{dN}{dt} = \underbrace{400 \cdot \left(\frac{3}{200}\right)^{\frac{1}{9}t}}_N \cdot \frac{1}{9} \cdot \ln\left(\frac{3}{200}\right) \rightarrow \text{growth rate}$$

in autonomous form is

$$\boxed{\frac{dN}{dt} = \frac{1}{9} \ln\left(\frac{3}{200}\right) \cdot N}$$