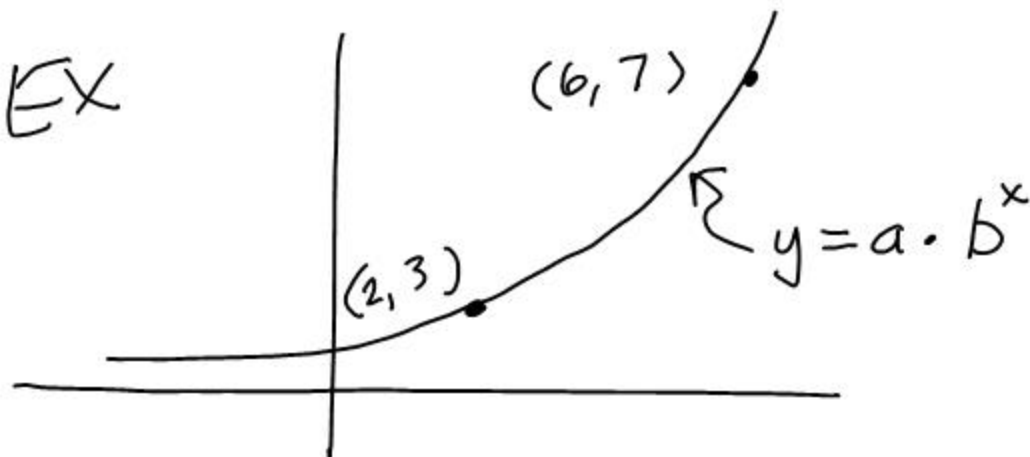


EX



Find the equation.

$$(2, 3) \quad \begin{cases} 3 = a \cdot b^2 \longrightarrow a = 3b^{-2} \end{cases}$$

$$(6, 7) \quad \begin{cases} 7 = a \cdot b^6 \end{cases}$$

← substitute

$$7 = 3b^{-2} \cdot b^6$$

$$7 = 3b^4$$

$$b^4 = \frac{7}{3}$$

$$b = \left(\frac{7}{3}\right)^{1/4}$$

$$a = 3 \left[\left(\frac{7}{3}\right)^{1/4} \right]^{-2}$$

$$a = 3 \left(\frac{7}{3}\right)^{-1/2}$$

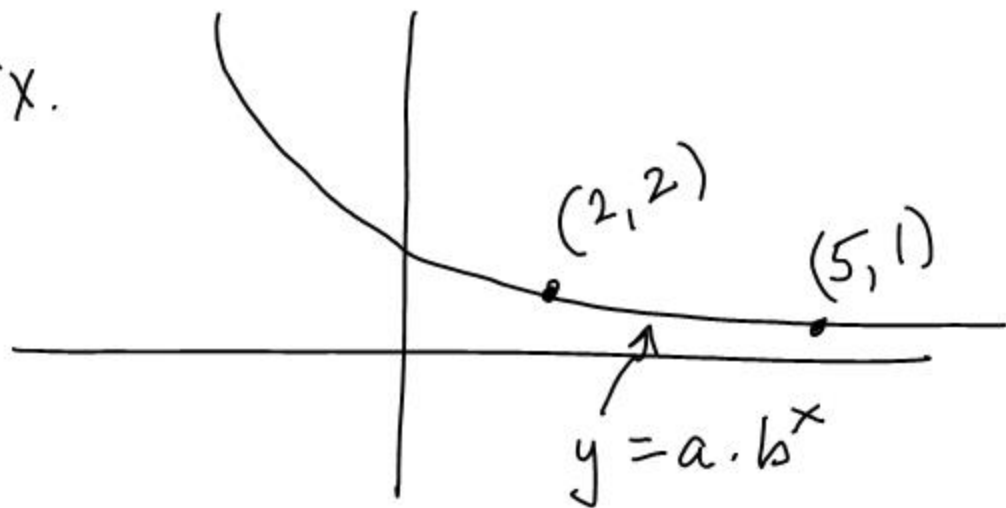
$$y = 3 \left(\frac{7}{3}\right)^{-1/2} \left(\frac{7}{3}\right)^{x/4}$$

$$y = 1.9640 (1.2360)^x$$

growth rate
 $r = 0.236$
 $= 23.6\%$

base = 1 + growth rate

Ex.



$$\begin{cases} 2 = a \cdot b^2 & \rightarrow & = 2b^{-2} \\ 1 = a \cdot b^5 & \leftarrow & \end{cases}$$

$$1 = 2b^{-2} \cdot b^5$$

$$1 = 2b^3$$

$$b^3 = \frac{1}{2}$$

$$b = \left(\frac{1}{2}\right)^{1/3}$$

$$a = 2 \left(\left(\frac{1}{2}\right)^{1/3} \right)^{-2}$$

$$a = 2 \left(\frac{1}{2}\right)^{-2/3}$$

$$y = 2 \left(\frac{1}{2}\right)^{-2/3} \left(\frac{1}{2}\right)^{x/3}$$

$$y = 3.1748 (0.7937)^x$$

$$\begin{aligned} \text{growth rate} &= 0.2063 \uparrow \\ &= -20.63\% \end{aligned}$$

Ex A town's pop. is 10000 at time $t = 0$.
It is decreasing in pop. by 2% each year.

a) Find the pop. in 5 years.

b) How long will it take to drop to 9000 people?

$$P = 10000 (1 - 0.02)^t$$

$$P = 10000 (0.98)^t$$

a) $P(5) = 10000 (0.98)^5 = 9039$

b) $9000 = 10000 (0.98)^t$

$$0.9 = 0.98^t$$

$$\ln 0.9 = t \cdot \ln 0.98$$

$$t = \frac{\ln 0.9}{\ln 0.98}$$

$$t = 5.2 \text{ yrs}$$

Half-Life

Ex. A certain element has a half-life of 152 days. Start with 100g of the material.

a) How much is left after 100 days?

b) How many days will it take to decay to 10g?

$$m = a \cdot b^t$$

↑
starting mass

$$m = 100 \cdot b^t$$
$$50 = 100 \cdot b^{152}$$

$$\frac{1}{2} = b^{152}$$

$$b = \left(\frac{1}{2}\right)^{\frac{1}{152}} = 0.99545$$

$$m = 100 (0.99545)^t$$

$$\rightarrow 1+r = 0.99545$$

$$r = -0.0045 = -0.45\%$$

a) $m(100) = 100 (0.99545)^{100} = \underline{\underline{63.4g}}$

$$b) 10 = 100 (0.99545)^t \quad \leftarrow \text{exp. eq.}$$

$$0.1 = 0.99545^t$$

$$\ln 0.1 = t \cdot \ln 0.99545$$

$$t = \frac{\ln 0.1}{\ln 0.99545} = 505 \text{ dzys}$$