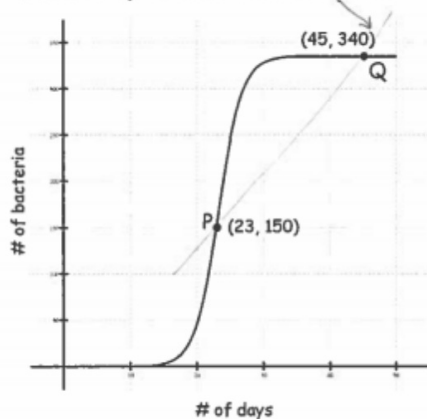


1. In an experiment of population of bacteria, find the average rate of change from P to Q and draw in the secant line.



avg rate of change:

$$\frac{340 - 150}{45 - 23} = \frac{190}{22} \approx 8.64 \text{ bacteria/day}$$

2. An equation to model the free fall of a ball dropped from 30 feet high is $f(x) = 30 - 16x^2$. What is the average rate of change for the first 3 minutes? State units. $0 \leq t \leq 3$

$$\frac{f(3) - f(0)}{3 - 0} = \frac{-114 - 30}{3} = -48 \text{ ft/min}$$

3. Use the table below to

- a) estimate $f'(1870)$ ^{slope}
 b) interpret the meaning of the value you found in part (a)

| t (yr) | 1850 | 1860 | 1870 | 1880 |
|-------------------|------|------|------|------|
| $f(t)$ (millions) | 23.1 | 31.4 | 38.6 | 50.2 |

$$a) \frac{50.2 - 38.6}{1880 - 1870} = 1.16 \text{ mill/yr}$$

$$\text{OR } \frac{38.6 - 31.4}{1870 - 1860} = 0.72 \text{ mill/yr}$$

b) $f(t)$ is increasing by about 1.16 (or 0.72) millions per year at $t = 1870$ yrs