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35.) In a city having a fixed population of P persons, the time rate of change of the number N of those persons who have heard a certain rumor is proportional to the number of those who have not yet heard the rumor.

write a differential equation that is a model of this situation

A simple model for population growth is:

$$\frac{dP}{dt} = KP$$

This is where the growth of the population is proportional to the size of the population.

However, the size of the population in the problem is fixed, and the population of individuals who have not heard the rumor decreases at the same rate that the rumor spreads.

The "rate of change" is taken to be

$\frac{dN}{dt}$ where the rate is proportional

we take that to mean

$$\frac{dN}{dt} = K f(N, P)$$

$f(N, P)$ is a function to express the number of individuals in a fixed population P that have not heard the rumor, so

$$f(N, P) = P - N$$

$$\frac{dN}{dt} = K(P - N)$$