Question #9621 The rate of decay of a strain of bacteria is proportional to the number of bacteria remaining.Show this as a differential equation and give an example of its solution with chosen numerical input.

Solution. Assume that $x(t)$ is the number of bacterias at the moment of time t. $x(0) = X$ is the initial quantity of bacterias. Next, $x'(t) = -\lambda x(t)$, where $\lambda > 0$ is some constant. The solution of this differential equation is $x(t) = Xe^{-\lambda t}$, consider $X = 10^9$, hence the number of bacterias at the moment t will equal $x(t) = 10^9 e^{-\lambda t}$.