

Exercise 43

A glucose solution is administered intravenously into the bloodstream at a constant rate r . As the glucose is added, it is converted into other substances and removed from the bloodstream at a rate that is proportional to the concentration at that time. Thus a model for the concentration $C = C(t)$ of the glucose solution in the bloodstream is

$$\frac{dC}{dt} = r - kC$$

where k is a positive constant.

- (a) Suppose that the concentration at time $t = 0$ is C_0 . Determine the concentration at any time t by solving the differential equation.
- (b) Assuming that $C_0 < r/k$, find $\lim_{t \rightarrow \infty} C(t)$ and interpret your answer.