

7. A sample of bacteria in a sealed container is being studied.

The number of bacteria, P , in thousands, is modelled by the differential equation

$$(1+t) \frac{dP}{dt} + P = t^{\frac{1}{2}}(1+t)$$

where t is the time in hours after the start of the study.

Initially, there are exactly 5000 bacteria in the container.

(a) Determine, according to the model, the number of bacteria in the container 8 hours after the start of the study.

(6)

(b) Find, according to the model, the rate of change of the number of bacteria in the container 4 hours after the start of the study.

(4)

(c) State a limitation of the model.

(1)