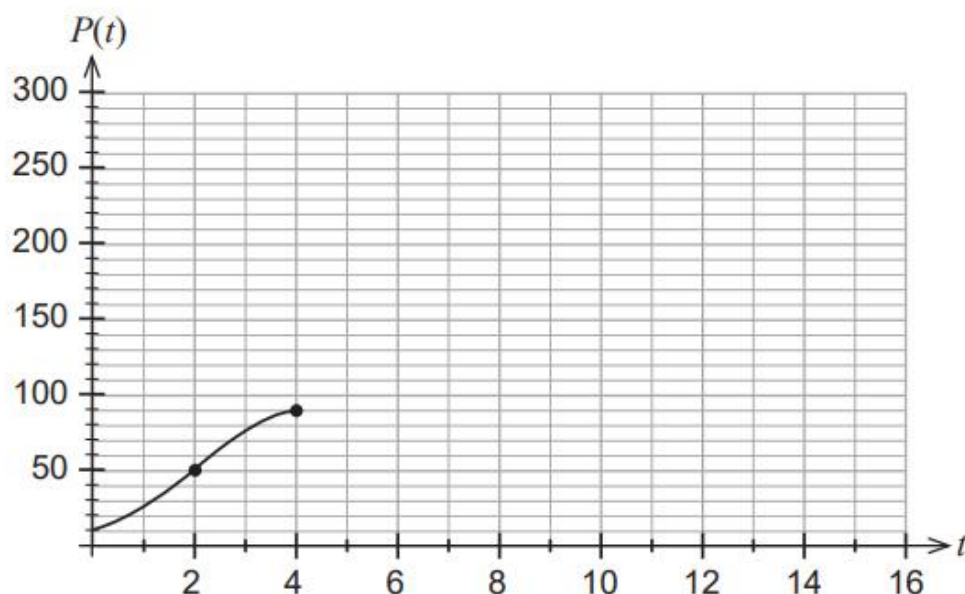**Question 16** (4 marks)

An ant colony population P at time t days grows at a rate given by the equation
$\frac{dP}{dt} = 0.01P(100 - P)$, where $0 \le t \le 4$. The graph of this population is shown below.

(a)   For $0 \le t \le 4$, using the growth rate equation explain the variation of the population.

(2 marks)

At the end of the fourth day, the environment for the ant colony improves dramatically so that its limiting population is increased to 300.

(b)   Sketch, on the axes above, the expected variation of the population for $t > 4$ days, using the increased limiting population value.

(2 marks)