11. The number of bees in a colony is monitored over time.

There were 3 500 bees in the colony when monitoring began.
After 1 week there were only 2 000 bees in the colony.

In a simple model, the rate of decrease in the number of bees is assumed to be proportional to the square of the number of bees.

Given that there are x **thousand** bees in the colony t weeks after monitoring began,

(a) form and solve a differential equation to show that an equation of the model is

$$x = \frac{14}{3t + 4}$$

(6)

There are only 500 bees in the colony T weeks after monitoring began.

(b) Use the equation of the model to find T

(2)