11. **In this question you must show all stages of your working.**

Solutions relying entirely on calculator technology are not acceptable.

The value of a car, £V, is modelled by the equation

$$V = 1500 + A\mathrm{e}^{-kt}$$

where A and k are positive constants and t is the age of the car in years.

Given that

- the initial value of the car was £20 000
- the value of the car was £12 000 when it was 2.5 years old

(a) find a complete equation for the model, giving the exact value of A and the value of k to 3 significant figures.

(4)

(b) Show that the rate of change in the value of the car can be expressed in the form

$$-k(V - 1500)$$

(3)

(c) State a limitation of this model.

(1)