4. In 1997 the average CO_2 emissions of new cars in the UK was 190 g/km.

In 2005 the average CO_2 emissions of new cars in the UK had fallen to 169 g/km.

Given A g/km is the average CO_2 emissions of new cars in the UK n years after 1997 and using a linear model,

(a) form an equation linking A with n.

(3)

In 2016 the average CO_2 emissions of new cars in the UK was 120 g/km.

(b) Comment on the suitability of your model in light of this information.

2020

(3)

(a) $A = mn + c$ as the linear model

$$m = \frac{\text{Change in } A}{\text{Change in } n} = \frac{169 - 190}{8} = \underline{-2.625}$$

Call 1997 $n = 0$. At this time $A = 190$

so $190 = m \times 0 + c \Rightarrow c = 190$

so $\underline{A = -2.625n + 190}$

(b) In 2016 $n = 19$. So the model predicts

$$A = -2.625 \times 19 + 190$$

$$\approx 140 \text{ g/km}$$

The actual data shows $A = 120$ g/km which is much smaller. So the fall is greater than predicted by a margin large than any likely error in measurement. So the model has become unsuitable after this time.