**9** Conservationists are studying how the number of bees in a wildflower meadow varies according to the number of wildflower plants. The study takes place over a series of weeks in the summer. A model is suggested for the number of bees, $B$, and the number of wildflower plants, $F$, at time $t$ weeks after the start of the study.

In the model $B = 20 + 2t + \cos 3t$ and $F = 50\mathrm{e}^{0.1t}$.

The model assumes that $B$ and $F$ can be treated as continuous variables.

**(a)** State the meaning of $\frac{\mathrm{d}B}{\mathrm{d}F}$. **[1]**

**(b)** Determine $\frac{\mathrm{d}B}{\mathrm{d}F}$ when $t = 4$. **[4]**

**(c)** Suggest a reason why this model may not be valid for values of $t$ greater than 12. **[1]**