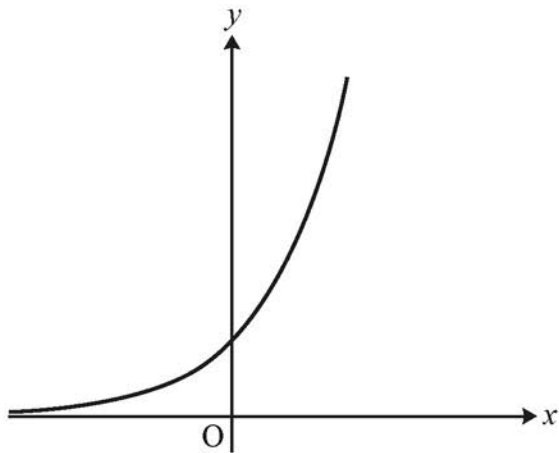**9** The graph shows the function $y = e^{2x}$.

(a) Describe the transformation of the graph of $y = e^x$ that gives the graph of $y = e^{2x}$. **[2]**

A second function is defined by $y = k + e^x$.

(b) A copy of the graph of $y = e^{2x}$ is given in the Printed Answer Booklet.

Add a sketch of the graph of $y = k + e^x$ in a case where k is a positive constant. **[2]**

(c) Show that the two graphs do not intersect for values of k less than $-\frac{1}{4}$. **[3]**

(d) In the case where $k = 2$, show that the only point of intersection occurs when $x = \ln 2$. **[2]**