A particle P of mass $2\,\text{kg}$ moving on a horizontal straight line has displacement $x\,\text{m}$ from a fixed point O on the line and velocity $v\,\text{m s}^{-1}$ at time t s. The only horizontal force acting on P has magnitude $\frac{1}{10}(2v-1)^2\text{e}^{-t}\,\text{N}$ and acts towards O. When $t = 0$, $x = 1$ and $v = 3$.

(a) Find an expression for v in terms of t. [5]

(b) Find an expression for x in terms of t. [4]