4. The function $\mathrm{h}(x)$ has domain $\mathbb{R}$ and range $\mathrm{h}(x) > 0$, and satisfies

$$\sqrt{\int \mathrm{h}(x)\ \mathrm{d}x} = \int \sqrt{\mathrm{h}(x)}\ \mathrm{d}x .$$

(*a*) By substituting $\mathrm{h}(x) = \left(\frac{\mathrm{d}y}{\mathrm{d}x}\right)^2$, show that

$$\frac{\mathrm{d}y}{\mathrm{d}x} = 2(y + c),$$

where c is constant.

(5)

(*b*) Hence find a general expression for y in terms of x.

(4)

(*c*) Given that $\mathrm{h}(0) = 1$, find $\mathrm{h}(x)$.

(2)