7 **(a)** Show that $\frac{d}{dx}(\tanh^{-1}x) = \frac{1}{1-x^2}$. [3]

(b) Find the solution of the differential equation

$$x\frac{dy}{dx} - y = x^2 \tanh^{-1}x,$$

for $0 < x < 1$, given that $y = 0$ when $x = \frac{1}{2}$. Give your answer in an exact form. [9]