7. (a) By writing $\tanh x$ in terms of exponentials, show that

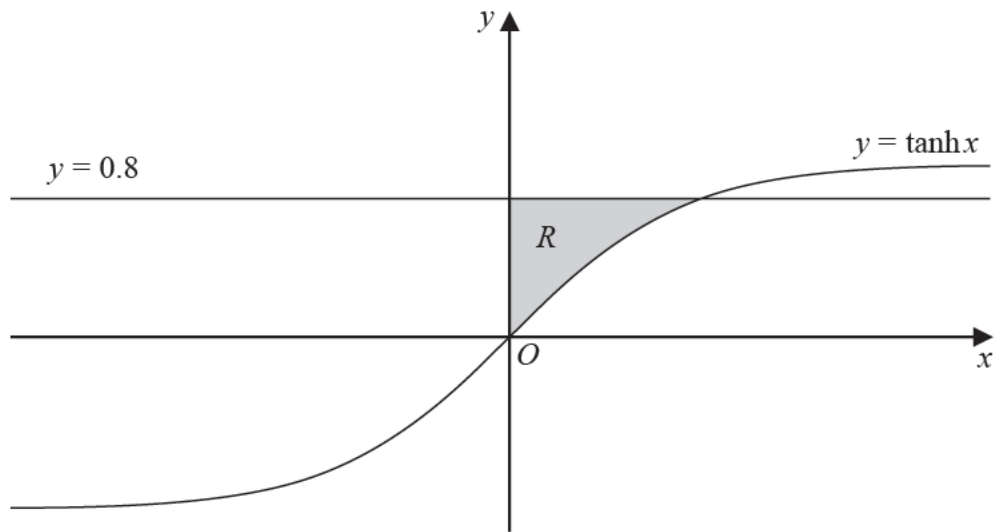$$\tanh^{-1} x = \frac{1}{2} \ln\left(\frac{1+x}{1-x}\right)$$

(3)

Figure 4

Figure 4 shows a sketch of part of the curve with equation $y = \tanh x$ and the line with equation $y = 0.8$

The finite region R, shown shaded in Figure 4, is bounded by the curve, the line with equation $y = 0.8$ and the y-axis.

The region R is rotated through 2π radians about the x-axis to form a solid of revolution.

(b) Determine the exact value of the volume of this solid of revolution, giving your answer in the form $\pi(a - b\ln 3)$, where a and b are simplified constants to be found.

(7)