Let $\mathrm{f}(x) = \dfrac{\mathrm{e}^{2x} + 1}{\mathrm{e}^{2x} - 1}$, for $x > 0$.

**(a)** The equation $x = \mathrm{f}(x)$ has one root, denoted by $a$.

Verify by calculation that $a$ lies between 1 and 1.5. [2]

**(b)** Use an iterative formula based on the equation in part **(a)** to determine $a$ correct to 2 decimal places. Give the result of each iteration to 4 decimal places. [3]

**(c)** Find $\mathrm{f}'(x)$. Hence find the exact value of $x$ for which $\mathrm{f}'(x) = -8$. [6]