4 It is given that $y = \dfrac{\tan 3x}{\sin x}$.

(a) Find the exact value of $\dfrac{\mathrm{d}y}{\mathrm{d}x}$ when $x = \dfrac{\pi}{3}$. [4]

(b) Hence find the approximate change in y as x increases from $\dfrac{\pi}{3}$ to $\dfrac{\pi}{3} + h$, where h is small. [1]

(c) Given that x is increasing at the rate of 3 units per second, find the corresponding rate of change in y when $x = \dfrac{\pi}{3}$, giving your answer in its simplest surd form. [2]

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[Turn over