7 It is given that $f(x) = 2e^x + a$ for $x \geqslant 0$, where a is an integer

and $g(x) = \sqrt{x-1}$ for $x \geqslant 1$.

(a) Find the least value of a so that the function gf exists for all $x \geqslant 0$. [2]

(b) In the case where $a = 5$, solve the equation $gf(x) = 3$.
Give your answer correct to 3 decimal places. [3]

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8 **(a)** Show that $\dfrac{\sin\theta\tan^2\theta}{1+\tan^2\theta}$ can be written as $\sin^3\theta$. [2]

(b) Hence solve the equation $\dfrac{\sin 3x\tan^2 3x}{1+\tan^2 3x} = \dfrac{1}{8}$ for $-180° \leqslant x \leqslant 180°$. [5]