2 **DO NOT USE A CALCULATOR IN THIS QUESTION.**

Write the expression $\dfrac{\sqrt{98x^{12}}}{3+\sqrt{2}}$ in the form $\left(a\sqrt{b}+c\right)x^{d}$ where a, b, c and d are integers. [4]

3 **(a)** Differentiate $\ln(x^3+3x^2)$ with respect to x, simplifying your answer. [2]

(b) Hence find $\displaystyle\int \frac{x+2}{x(x+3)}\mathrm{d}x$. [2]