3 Write $3\lg x + 2 - \lg y$ as a single logarithm. [3]

4 It is given that $y = \ln(\sin x + 3\cos x)$ for $0 < x < \frac{\pi}{2}$.

(a) Find $\frac{\mathrm{d}y}{\mathrm{d}x}$. [3]

(b) Find the value of x for which $\frac{\mathrm{d}y}{\mathrm{d}x} = -\frac{1}{2}$. [3]

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5 The first three terms in the expansion of $(a+bx)^5(1+x)$ are $32-208x+cx^2$. Find the value of each of the integers a, b and c. [7]