2 **(a)** Given that $\log_p a + \log_p 12 - \log_p 6 = 3\log_p 4$, find the value of a. [3]

(b) Find the exact solutions of the equation $4\log_3 x = 9\log_x 3$. [4]

3 The curve C has equation $y = \ln\left(x^3 + 3\right)$. The normal to C at the point where $x = 1$ meets the line $y = x$ at the point P. Find the exact coordinates of P. [7]