8 DO NOT USE A CALCULATOR IN THIS QUESTION.

$$\log_2(y+1) = 3 - 2\log_2 x$$
$$\log_2(x+2) = 2 + \log_2 y$$

(a) Show that $x^3 + 6x^2 - 32 = 0$. [4]

(b) Find the roots of $x^3 + 6x^2 - 32 = 0$. [4]

(c) Give a reason why only one root is a valid solution of the logarithmic equations. Find the value of y corresponding to this root. [2]