3. (a) Using the appropriate definitions of hyperbolic functions in terms of exponentials, show that

$$\sinh x + \operatorname{sech} x = \frac{e^{4x} + 4e^{2x} - 1}{2e^{3x} + 2e^{x}}$$

(4)

(b) Hence solve the equation

$$\sinh x + \operatorname{sech} x = \frac{1}{2}e^{x}$$

Give the answer in the form $a \ln b$ where a is a rational number and b is an integer.

(*Solutions relying on calculator technology are not acceptable.*)

(4)

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Question 3 continued

(Total for Question 3 is 8 marks)