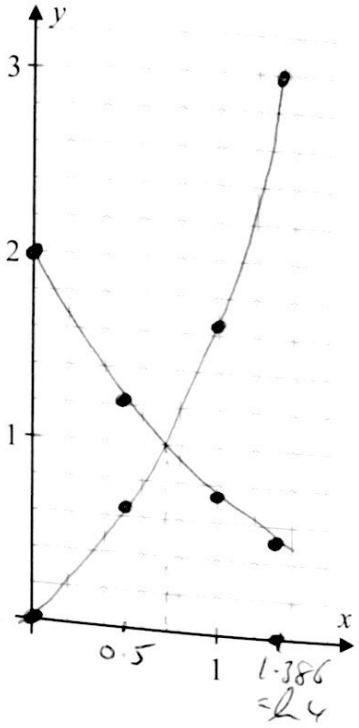
Question 3 Oct 16 **(25 marks)**

(a) **(i)** $f(x) = \frac{2}{e^x}$ and $g(x) = e^x - 1$, where $x \in \mathbb{R}$.

Complete the table below. Write your values correct to two decimal places where necessary.

x	0	0·5	1	ln(4)
$f(x) = \frac{2}{e^x}$	2	1·21	0·74	0·5
$g(x) = e^x - 1$	0	0·65	1·72	3

(ii) In the grid on the right, use the table to draw the graphs of $f(x)$ and $g(x)$ in the domain $0 \le x \le \ln(4)$. Label each graph clearly.



(iii) Use your graphs to estimate the value of x for which $f(x) = g(x)$.

$x = 0 \cdot 75$

(b) Solve $f(x) = g(x)$ using algebra.

$$\frac{2}{e^x} = e^x - 1$$

$$2 = e^{2x} - e^x$$

$$\therefore 0 = (e^x)^2 - e^x - 2$$

$$\therefore 0 = (e^x - 2)(e^x + 1)$$

$$\therefore e^x - 2 = 0 \quad \text{or} \quad e^x = -1$$

$$e^x = 2 \qquad x = \ln -1$$

$$x = \ln 2$$

$$= 0 \cdot 693$$

7 → D. this one.