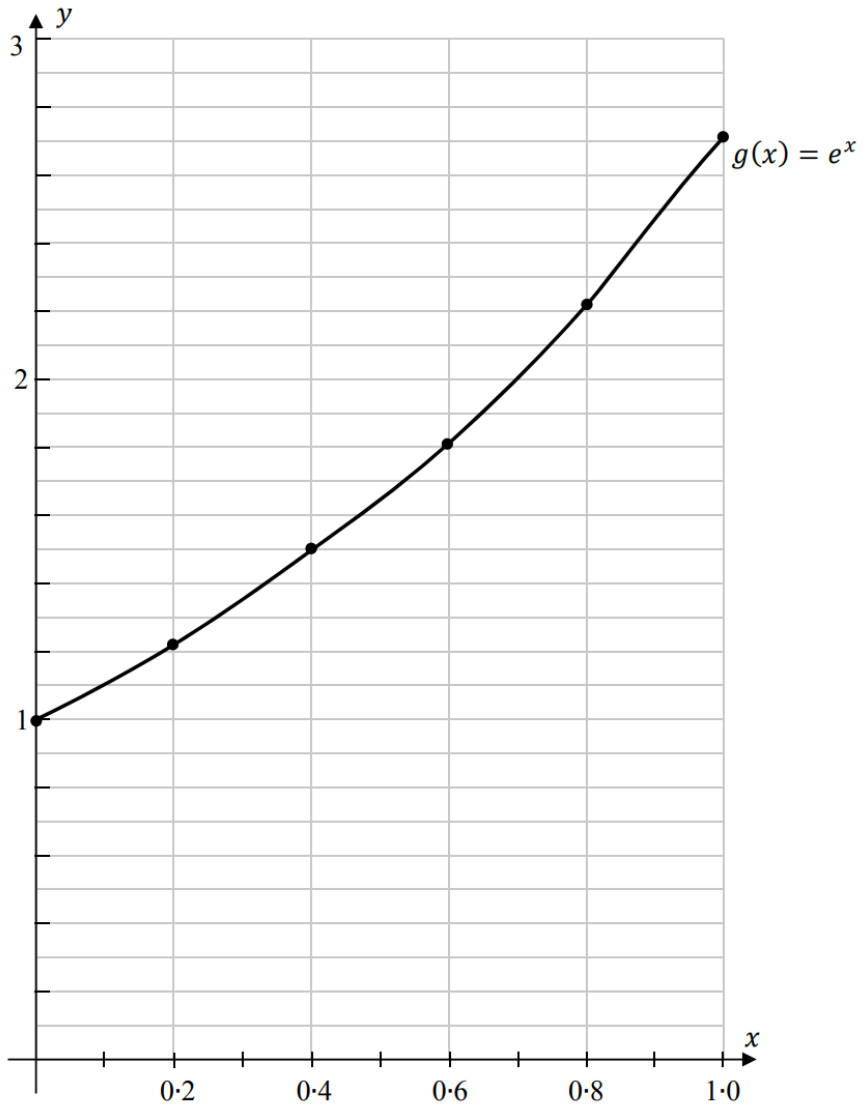
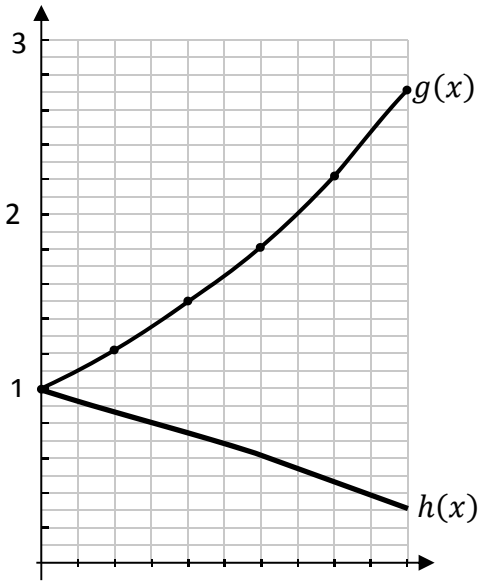
Question 6 **(25 marks)**

The graph of the function $g(x) = e^x$, $x \in \mathbb{R}$, $0 \leq x \leq 1$, is shown on the diagram below.

(a) On the same diagram, draw the graph of $h(x) = e^{-x}$, $x \in \mathbb{R}$, in the domain $0 \leq x \leq 1$.

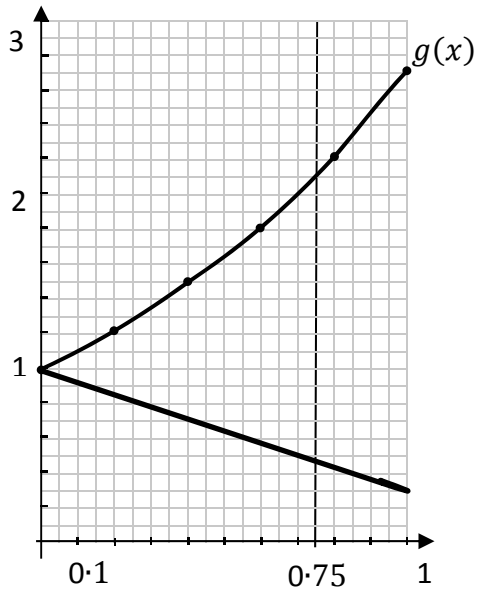


(b) Find the area enclosed by $g(x) = e^x$, $h(x) = e^{-x}$, and the line $x = 0{\cdot}75$.
Give your answer correct to 4 decimal places.

Q6	Model Solution – 25 Marks	Marking Notes
(a)	 $g(x) = e^x \quad h(x) = e^{-x} = \frac{1}{e^x}$ $g(x) = e^x$: | x | 0 | 0·2 | 0·4 | 0·6 | 0·8 | 1·0 | | y | 1 | 1·22 | 1·49 | 1·82 | 2·23 | 2·72 | $h(x) = \frac{1}{e^x}$: | x | 0 | 0·2 | 0·4 | 0·6 | 0·8 | 1·0 | | y | 1 | 0·82 | 0·67 | 0·55 | 0·45 | 0·37 |	**Scale 15C (0, 5, 10, 15)** *Low Partial Credit:* • one point correct *High Partial Credit* • Graph not in required domain

[13]

(b)



$$A = \int_0^{0\cdot75} e^x dx - \int_0^{0\cdot75} e^{-x} dx$$

$$= \int_0^{0\cdot75} (e^x - e^{-x}) dx$$

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

$$e^{0\cdot75} + e^{-0\cdot75} - [e^0 + e^0]$$

$$= 0\cdot5894$$

Scale 10C (0, 5, 8, 10)

Low Partial Credit:

- Formulates integration for area under one curve with limits

High Partial Credit

- integrates twice for correct area under both curves

Note: Trapezoidal rule must have at least 5 divisions AND fully correct work gets Low Partial Credit