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7 **(a)** In the expansion of $\left(x+x^2\right)^8$ in ascending powers of x, the 3rd and 6th terms are equal.

Find the value of x. [3]

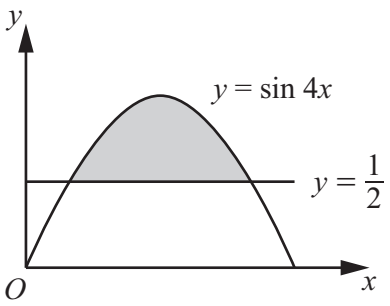
(b) In the expansion of $\left(x+\frac{2}{x}\right)^n$ in decreasing powers of x, the 6th term is a constant.

(i) Find the value of the positive integer n. [2]

(ii) Find the value of the 6th term. [2]

8 **(a)** Solve the equation $\sin 4x = \frac{1}{2}$ for $0 \leqslant x \leqslant \frac{\pi}{4}$, giving your answers in terms of π. [2]

(b)



The diagram shows parts of the graphs of $y = \sin 4x$ and $y = \frac{1}{2}$.

Find the exact area of the shaded region enclosed by the curve and the line. [5]

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