

I5 SINGLE PART

P3

- 1 Find the exact value of the constant k for which $\int_1^k \frac{1}{2x-1} dx = 1$. [4]

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- 2 Use integration by parts to show that

$$\int_2^4 \ln x dx = 6 \ln 2 - 2. \quad [4]$$

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- 3 Show that $\int_0^\pi x^2 \sin x dx = \pi^2 - 4$. [5]

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- 4 Show that $\int_0^1 (1-x)e^{-\frac{1}{2}x} dx = 4e^{-\frac{1}{2}} - 2$. [5]

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- 5 Find the exact value of $\int_1^4 \frac{\ln x}{\sqrt{x}} dx$. [5]

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- 6 (a) Find $\int (4 + \tan^2 2x) dx$. [3]

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- 7 Find the exact value of $\int_0^{\frac{1}{2}} xe^{-2x} dx$. [5]

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- 8 Find the exact value of $\int_0^{\frac{1}{2}\pi} x^2 \sin 2x dx$. [5]

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- 9 Find the exact value of $\int_0^{\frac{1}{2}\pi} \theta \sin \frac{1}{2}\theta d\theta$. [4]

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- 10 Showing all necessary working, find the value of $\int_0^{\frac{1}{6}\pi} x \cos 3x \, dx$, giving your answer in terms of π . [5]

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- 11 (i) Find $\int \frac{\ln x}{x^3} \, dx$. [3]

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- 12 Show that $\int_0^{\frac{1}{4}\pi} x^2 \cos 2x \, dx = \frac{1}{32}(\pi^2 - 8)$. [5]

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