JC1 H2 Mathematics (9758)
Term 4 Revision Topical Quick Check
Chapter 10 Integration Techniques

1 HCI Promo 9758/2022/Q8

(a) Find $\int 3t\tan^{-1}(3t)\,\mathrm{d}t$. [4]

(b) Using the substitution $u = x^2 + 1$, show that $\int_0^{\sqrt{7}} x^3\left(x^2+1\right)^{\frac{1}{3}}\,\mathrm{d}x$ can be expressed as

$$\frac{1}{2}\int_a^b u^{\frac{4}{3}} - u^{\frac{1}{3}}\,\mathrm{d}u,$$

where a and b are constants to be determined.

Hence find the exact value of $\int_0^{\sqrt{7}} x^3\left(x^2+1\right)^{\frac{1}{3}}\,\mathrm{d}x$. [5]

2 EJC Promo 9758/2022/Q6

(a) Find $\int x\mathrm{e}^{3x^2+1}\,\mathrm{d}x$. [1]

(b) Find $\int \sin^2(5x)\,\mathrm{d}x$. [3]

(c) Find $\int \frac{x}{4x^2-4x+17}\,\mathrm{d}x$. [5]

3 MI PU2 P1 Promo 9758/2022/Q4

(i) Find $\int \cos 2x \sin x\,\mathrm{d}x$. [3]

(ii) Find $\int \frac{\mathrm{e}^{\sin^{-1}2x}}{\sqrt{1-4x^2}}\,\mathrm{d}x$. [2]

(iii) Find $\int \frac{5}{x^2+6x+13}\,\mathrm{d}x$. [3]

Answer Key

No.	Year	JC	Answers
1	2022	HCI	(a) $\frac{3}{2}t^2\tan^{-1}(3t)-\frac{1}{2}t+\frac{1}{6}\tan^{-1}(3t)+C$ (b) $\frac{1209}{56}$
2	2022	EJC	(a) $\frac{1}{6}e^{3x^2+1}+c$ (b) $\frac{1}{2}x-\frac{1}{20}\sin 10x+c$ (c) $\frac{1}{8}\ln\left(4x^2-4x+17\right)+\frac{1}{16}\tan^{-1}\left(\frac{2x-1}{4}\right)+c$
3	2022	MI	(i) $-\frac{2}{3}\cos^3 x+\cos x+C$ $\left(\text{or } -\frac{1}{6}\cos 3x+\frac{1}{2}\cos x+c\right)$ (ii) $\frac{1}{2}e^{\sin^{-1}2x}+c$ (iii) $\frac{5}{2}\tan^{-1}\left(\frac{x+3}{2}\right)+c$