Integration – 2021 A2

1. June/2021/Paper_9709/21/No.3

(a) Show that $(\sec x + \cos x)^2$ can be expressed as $\sec^2 x + a + b\cos 2x$, where a and b are constants to be determined. [2]

(b) Hence find the exact value of $\int_0^{\frac{1}{4}\pi} (\sec x + \cos x)^2 \, dx$. [4]

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2. June/2021/Paper_9709/21/No.6

(a) Use the trapezium rule with three intervals to find an approximation to $\int_1^4 \frac{6}{1+\sqrt{x}}\,dx$. Give your answer correct to 5 significant figures. [3]

(b) Find the exact value of $\int_1^4 2e^{\frac{1}{2}x-2}\,dx$. [3]

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3. June/2021/Paper_9709/22/No.4

(a) Find the exact value of $\int_0^2 6e^{2x+1}\,dx$. [3]

(b) Find $\int (\tan^2 x + 4\sin^2 2x)\,dx$. [5]

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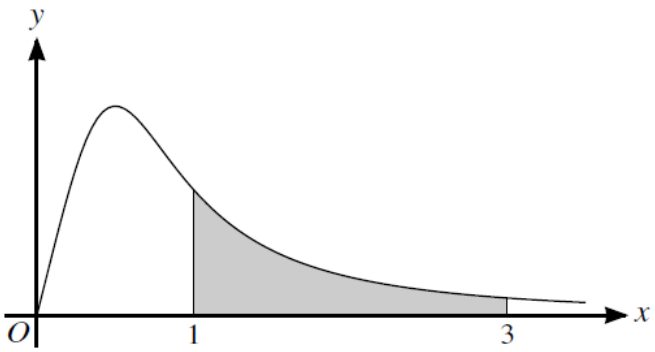
4. March/2021/Paper_9709/22/No.4



The diagram shows part of the curve with equation $y = \dfrac{5x}{4x^3 + 1}$. The shaded region is bounded by the curve and the lines $x = 1$, $x = 3$ and $y = 0$.

(a) Find $\dfrac{dy}{dx}$ and hence find the x-coordinate of the maximum point. [4]

(b) Use the trapezium rule with two intervals to find an approximation to the area of the shaded region. Give your answer correct to 2 significant figures. [3]

(c) State, with a reason, whether your answer to part **(b)** is an over-estimate or under-estimate of the exact area of the shaded region. [1]

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5. March/2021/Paper_9709/22/No.7c

(c) Find $\int \frac{1}{(5\sqrt{3}\cos 3\theta + 5\sin 3\theta)^2}\,\mathrm{d}\theta$. [3]

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