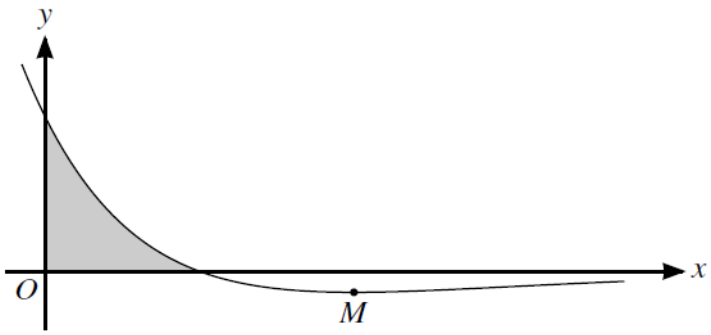
Integration – 2020 A2

1. Nov/2020/Paper_9709/31/No.10b



The diagram shows the curve $y = (2 - x)e^{-\frac{1}{2}x}$, and its minimum point M.

(b) Find the area of the shaded region bounded by the curve and the axes. Give your answer in terms of e. [5]

2. Nov/2020/Paper_9709/32/No.9

Let $f(x) = \dfrac{7x + 18}{(3x + 2)(x^2 + 4)}$.

(a) Express $f(x)$ in partial fractions. [5]

(b) Hence find the exact value of $\int_0^2 f(x)\,dx$. [6]

3. June/2020/Paper_9709/31/No.5

(a) Find the quotient and remainder when $2x^3 - x^2 + 6x + 3$ is divided by $x^2 + 3$. [3]

(b) Using your answer to part **(a)**, find the exact value of $\int_1^3 \frac{2x^3 - x^2 + 6x + 3}{x^2 + 3} \, dx$. [5]

4. June/2020/Paper_9709/32/No.3

Find the exact value of

$$\int_1^4 x^{\frac{3}{2}} \ln x \, dx. \qquad [5]$$

5. June/2020/Paper_9709/33/No.2

Find the exact value of $\int_0^1 (2-x)e^{-2x}\,dx$. [5]

6. June/2020/Paper_9709/33/No.7c

Let $\mathrm{f}(x) = \dfrac{2}{(2x-1)(2x+1)}$.

(c) Hence show that $\displaystyle\int_1^2 (\mathrm{f}(x))^2 \, \mathrm{d}x = \frac{2}{5} + \frac{1}{2}\ln\left(\frac{5}{9}\right)$. [5]

7. March/2020/Paper_9709/32/No.4

Find $\int_{\frac{1}{6}\pi}^{\frac{1}{3}\pi} x \sec^2 x \, dx$. Give your answer in a simplified exact form. [7]