Integration – 2021 A2 Nov P3

1. Nov/2021/Paper_9709/31/No.4

Using the substitution $u = \sqrt{x}$, find the exact value of

$$\int_3^\infty \frac{1}{(x+1)\sqrt{x}}\,\mathrm{d}x. \qquad [6]$$

2. Nov/2021/Paper_9709/32/No.6(b)

(b) Hence show that $\int_0^{\frac{1}{4}\pi} \sin 3x \cos 2x \, dx = \frac{1}{5}(3 - \sqrt{2})$. [3]

3. Nov/2021/Paper_9709/33/No.4

Find the exact value of $\int_{\frac{1}{3}\pi}^{\pi} x \sin \frac{1}{2}x \, dx$. [5]

4. Nov/2021/Paper_9709/33/No.9

Let $f(x) = \dfrac{1}{(9-x)\sqrt{x}}$.

(a) Find the x-coordinate of the stationary point of the curve with equation $y = f(x)$. [4]

(b) Using the substitution $u = \sqrt{x}$, show that $\int_0^4 \mathrm{f}(x)\,\mathrm{d}x = \frac{1}{3}\ln 5$. [6]