1. June/2023/Paper_9709/21/No.7

(a) Express $7\cos\theta + 24\sin\theta$ in the form $R\cos(\theta - \alpha)$, where $R > 0$ and $0° < \alpha < 90°$. Give the value of α correct to 2 decimal places. [3]

(b) Solve the equation $7\cos\theta + 24\sin\theta = 18$ for $0° < \theta < 360°$. [4]

(c) As β varies, the greatest possible value of

$$\frac{150}{7\cos\frac{1}{2}\beta + 24\sin\frac{1}{2}\beta + 50}$$

is denoted by V.

Find the value of V and determine the smallest positive value of β (in degrees) for which the value of V occurs. [4]

2. June/2023/Paper_9709/22/No.1

Use logarithms to solve the equation $12^x = 3^{2x+1}$. Give your answer correct to 3 significant figures.

[4]

3. June/2023/Paper_9709/22/No.6(a, b)

(a) Show that $4\sin\left(\theta+\frac{1}{3}\pi\right)\cos\left(\theta-\frac{1}{3}\pi\right) \equiv \sqrt{3}+2\sin 2\theta$. [4]

(b) Find the exact value of $4\sin\frac{17}{24}\pi\cos\frac{1}{24}\pi$. [2]