

1. Solve $\sin 2x = \sqrt{2} \cos x$, $0 \leq x \leq \pi$. (Total 6 marks)

2. Let $\sin x = s$.

(a) Show that the equation $4 \cos 2x + 3 \sin x \operatorname{cosec}^3 x + 6 = 0$ can be expressed as $8s^4 - 10s^2 + 3 = 0$. (3)

(b) Hence solve the equation for x , in the interval $[0, \pi]$. (6)
(Total 9 marks)

3. The angle θ satisfies the equation $2 \tan^2 \theta - 5 \sec \theta - 10 = 0$, where θ is in the second quadrant. Find the value of $\sec \theta$. (Total 6 marks)

4. (a) Sketch the curve $f(x) = \sin 2x$, $0 \leq x \leq \pi$. (2)

(b) Hence sketch on a separate diagram the graph of $g(x) = \csc 2x$, $0 \leq x \leq \pi$, clearly stating the coordinates of any local maximum or minimum points and the equations of any asymptotes. (5)

(c) Show that $\tan x + \cot x \equiv 2 \csc 2x$. (3)

(d) Hence or otherwise, find the coordinates of the local maximum and local minimum points on the graph of $y = \tan 2x + \cot 2x$, $0 \leq x \leq \frac{\pi}{2}$. (5)

(e) Find the solution of the equation $\csc 2x = 1.5 \tan x - 0.5$, $0 \leq x \leq \frac{\pi}{2}$. (6)
(Total 21 marks)