STEP/Trigonometry Q10 (30/6/23)

Show that $\quad tan\theta + cot\theta \equiv sec\theta cosec\theta$

Solution

Method 1

$tan\theta + cot\theta \equiv sec\theta cosec\theta$ is equivalent to

$tan\theta + cot\theta - sec\theta cosec\theta \equiv 0$ (1)

LHS of (1) $= \frac{sin^2\theta + cos^2\theta - 1}{cos\theta sin\theta} = \frac{0}{cos\theta sin\theta} = 0$, as required

Method 2

$tan\theta + cot\theta \equiv sec\theta cosec\theta$ is equivalent to

$\frac{tan\theta + cot\theta}{sec\theta cosec\theta} = 1$ (2)

LHS of (2) $= \frac{sin^2\theta + cos^2\theta}{1} = 1$, as required