6.4) Trigonometric identities

Worked example

Using $\sin^2 x + \cos^2 x \equiv 1$, prove that:

$$1 + \tan^2 x = \sec^2 x$$

Your turn

Using $\sin^2 x + \cos^2 x \equiv 1$, prove that:

$$1 + \cot^2 x = \operatorname{cosec}^2 x$$

Proof

Worked example	Your turn
Prove that: $cosec^2\theta - \sin^2\theta \equiv \cos^2\theta\,(1 + \operatorname{cosec}^2\theta)$	Prove that: $\sec^2\theta - \cos^2\theta \equiv \sin^2\theta\,(1 + \sec^2\theta)$ Proof

Worked example	Your turn
Prove that: $$sec^4\theta - \tan^4\theta = \frac{1+\sin^2\theta}{1-\sin^2\theta}$$	Prove that: $$cosec^4\theta - \cot^4\theta = \frac{1+\cos^2\theta}{1-\cos^2\theta}$$ Proof

Worked example	Your turn
Solve in the interval $0° \leq \theta \leq 360°$: $5\,sec^2\theta - 1 = 9\tan\theta$	Solve in the interval $0° \leq \theta \leq 360°$: $4\,sec^2\theta - 9 = \tan\theta$ $\theta = 51.3°, 135.0°, 231.3°, 315.0°$ (1 dp)

Worked example	Your turn
Solve in the interval $0° \leq \theta \leq 360°$: $$5\,cosec^2\theta - 1 = 9\cot\theta$$	Solve in the interval $0° \leq \theta \leq 360°$: $$4\,cosec^2\theta - 9 = \cot\theta$$ $\theta = 38.7°, 135.0°, 218.7°, 315.0°$ (1 dp)

Worked example	Your turn
Given that $x = cosec\,\theta + \cot\theta$, express in its simplest form: $$x^2 + \frac{1}{x^2} + 2$$	Given that $x = \sec\theta + \tan\theta$, express in its simplest form: $$x^2 + \frac{1}{x^2} + 2$$ $$4\sec^2\theta$$