Trigonometric Ratios Ex 5.3 Q8

Answer :

(i) We have to prove: $\sin\theta.\sin\left(90^\circ-\theta\right)-\cos\theta.\cos\left(90^\circ-\theta\right)=0$

Left hand side

$$=\sin\theta.\sin\left(90^\circ-\theta\right)-\cos\theta.\cos\left(90^\circ-\theta\right)$$
$$=\sin\theta.\cos\theta-\cos\theta.\sin\theta$$
$$=\sin\theta\left(\cos\theta-\cos\theta\right)$$
$$=0$$

=Right hand side

Proved

(ii) We have to prove: $\dfrac{\cos\left(90^\circ-\theta\right).\sec\left(90^\circ-\theta\right).\tan\theta}{\operatorname{cosec}\left(90^\circ-\theta\right).\sin\left(90^\circ-\theta\right).\cot\left(90^\circ-\theta\right)}+\dfrac{\tan\left(90^\circ-\theta\right)}{\cot\theta}=2$

Left hand side

$$=\frac{\cos\left(90^\circ-\theta\right).\sec\left(90^\circ-\theta\right).\tan\theta}{\operatorname{cosec}\left(90^\circ-\theta\right).\sin\left(90^\circ-\theta\right).\cot\left(90^\circ-\theta\right)}+\frac{\tan\left(90^\circ-\theta\right)}{\cot\theta}$$
$$=\frac{\sin\theta.\operatorname{cosec}\theta.\tan\theta}{\sec\theta.\cos\theta.\tan\theta}+\frac{\cot\theta}{\cot\theta}$$
$$=\frac{\tan\theta}{\tan\theta}+\frac{\cot\theta}{\cot\theta}$$
$$=1+1$$
$$=\boxed{2}$$

= right hand side

Proved

(iii) We have to prove: $\frac{\tan(90^{o}\text{-A})\cot\text{A}}{\operatorname{cosec}^2\text{A}} - \cos^2 A = 0$

Left hand side

$$= \frac{\tan(90^\circ - A)\cot A}{\operatorname{cosec}^2 A} - \cos^2 A$$

$$= \frac{\cot A.\cot A}{\operatorname{cosec}^2 A} - \cos^2 A$$

$$= \frac{\cot^2 A}{\operatorname{cosec}^2 A} - \cos^2 A$$

$$= \frac{\cos^2 A.\sin^2 A}{\sin^2 A} - \cos^2 A$$

$$= \cos^2 A - \cos^2 A$$

$$= \boxed{0}$$

= right hand side

Proved

(iv) We have to prove: $\frac{\cos(90^\circ - A).\sin(90^\circ - A)}{\tan(90^\circ - A)} = \sin^2 A$

Left hand side

$$= \frac{\cos(90^\circ - A).\sin(90^\circ - A)}{\tan(90^\circ - A)}$$

$$= \frac{\sin A.\cos A}{\cot A} = \sin^2 A$$

$$= \frac{\sin A.\cos A.\sin A}{\cos A}$$

$$= \boxed{\sin^2 A}$$

= Right hand side

Proved

(v) We have to prove: $\sin(50^\circ + \theta) - \cos(40^\circ - \theta) + \tan 1^\circ \tan 10^\circ \tan 70^\circ \tan 80^\circ \tan 89 = 1$

Left hand side

$$= \sin(50^\circ + \theta) - \cos(40^\circ - \theta) + \tan 1^\circ \tan 10^\circ \tan 20^\circ \tan 70^\circ \tan 80^\circ \tan 89^\circ$$

$$= \cos\left[90^\circ - (50^\circ + \theta)\right] - \cos(40^\circ - \theta) + \tan(90^\circ - 89^\circ)\tan(90^\circ - 80^\circ)\tan(90^\circ - 70^\circ)\tan 70^\circ \tan 80^\circ \tan 89^\circ$$

$$= \cos(40^\circ - \theta) - \cos(40^\circ - \theta) + \cot 89^\circ.\cot 80^\circ.\cot 70^\circ.\tan 70^\circ.\tan 80^\circ.\tan 89^\circ$$

$$= 0 + (\tan 89^\circ.\cot 89^\circ)(\tan 80^\circ.\cot 80^\circ)(\tan 70^\circ.\cot 70^\circ)$$

Since $\tan\theta.\cot\theta = 1$ .So

$$= 1 \times 1 \times 1$$

$$= \boxed{1}$$

=Right hand side

Proved

*********** END **********