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: $\dfrac{\tan\left(90^{o}\text{-A}\right)\cot\text{A}}{\text{cosec}^{2}\text{A}} - \cos^{2} A = 0$

Left hand side

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

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

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

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

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

$$= \boxed{0}$$

= right hand side

Proved

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

Left hand side

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

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

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

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

= Right hand side

Proved

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

Left hand side

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

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

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

$$= 0 + \left(\tan 89^{\circ}.\cot 89^{\circ}\right)\left(\tan 80^{\circ}.\cot 80^{\circ}\right)\left(\tan 70^{\circ}.\cot 70^{\circ}\right)$$

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

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

$$= \boxed{1}$$

=Right hand side

Proved

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