**Five Trigonometry Identities problems**

**1.** If A + B + C = 180o ,

prove that tan A + tan B + tan C = tan A tan B tan C.

**2.** Prove that = 4 sin A cos 2A sin 3A

**3.** Prove that tan 4A (sin 2A + sin 10A) = cos 2A – cos 10 A

**4.** Prove that sin A (sin 3A + sin 5A) = cos A ( cos 3A – cos 5A)

**5.** Prove that tan A + tan (A + 120o) + tan (A + 240o) = 3 tan 3A

**Solutions**

**1.** A + B + C = 180o ⇒ A + B = 180o – C

**2.**

**3.**

**4.**

**5.** **Method 1**

 **Method 2**

 Rearrange,

 Or

 Construct the equation:

 Observe that tan 3A = tan 3(A + 120o) = tan 3(A + 240o)

 Then tan A , tan (A + 120o) , tan (A + 240o) are roots of f(t) = 0.

 Since f(t) = 0 is a cubic equation and has three roots,

 Sum of roots

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