For a triangle ABC having area $\Delta$, the expression $\dfrac{(a+b+c)(b+c-a)(c+a-b)(a+b-c)}{4b^2c^2} =$

(1) $a^2$ 　　　　　(2) $\sin^2 A$ 　　　　　(3) $\sin A$ 　　　　　(4) $2\left(\dfrac{\Delta}{bc}\right)^2$

*Solution*

The given expression = $\dfrac{2s(2s-a-a)(2s-b-b)(2s-c-c)}{4b^2c^2}$

$= \dfrac{16s(s-a)(s-b)(s-c)}{4b^2c^2}$

$= 4\dfrac{\Delta^2}{b^2c^2} = 4 \times \dfrac{1}{4}\sin^2 A \quad \left[\because \Delta = \dfrac{1}{2}bc\sin A, \dfrac{\Delta}{bc} = \dfrac{1}{2}\sin A\right]$

$= \sin^2 A$

Hence, (2)