Related Questions with Solutions

Questions

Quetion: 01

If $\cos\alpha + \cos\beta = m$ and $\sin\alpha + \sin\beta = n$, then $\sin(\alpha + \beta) =$

A. $\dfrac{m^2 - n^2}{m^2 + n^2}$

B. $\dfrac{n^2 - m^2}{2}$

C. $\dfrac{2mn}{m^2 + n^2}$

D. $\dfrac{2mn}{m^2 - n^2}$

Solutions

Solution: 01

$$m = \cos\alpha + \cos\beta = 2\cos\left(\frac{\alpha+\beta}{2}\right)\cos\left(\frac{\alpha-\beta}{2}\right)$$

$$n = \sin\alpha + \sin\beta = 2\sin\left(\frac{\alpha+\beta}{2}\right)\cos\left(\frac{\alpha-\beta}{2}\right)$$

$$\therefore \frac{n}{m} = \tan\left(\frac{\alpha+\beta}{2}\right)$$

Now, $\sin(\alpha + \beta) = \dfrac{2\tan\left(\frac{\alpha+\beta}{2}\right)}{1+\tan^2\left(\frac{\alpha+\beta}{2}\right)} = \dfrac{\frac{2n}{m}}{1+\left(\frac{n^2}{m^2}\right)} = \dfrac{2mn}{m^2 + n^2}$

Correct Options

Answer:01

Correct Options: C