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1. In any triangle ABC , prove that:

$$a = b \cos C + c \cos B$$

$$b = c \cos A + a \cos C$$

$$c = a \cos B + b \cos A$$

2. Evaluate:

$$\sin 1^\circ + \sin 2^\circ + \sin 3^\circ + \cdots + \sin 357^\circ + \sin 358^\circ + \sin 359^\circ$$

$$\sin^2 1^\circ + \sin^2 2^\circ + \sin^2 3^\circ + \cdots + \sin^2 357^\circ + \sin^2 358^\circ + \sin^2 359^\circ$$

3. Find the solution(s) for: $\cos 2x + \cos 4x = \cos x$