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$$16. (1). \cos A = \frac{b^2 + c^2 - a^2}{2bc} = \frac{\sqrt{5}}{2}$$

$$\frac{1}{2}c^2 = b^2 - a^2$$

$$c^2 = a^2 + b^2 - 2ab \cos C$$

$$\sin B - \sin^2 A = \pm \sin^2 C$$

$$\sin^2 A \cos^2 C + \pm \sin^2 A \cdot \pm \sin^2 C + \pm \sin^2 C \cdot \pm \sin^2 A + \sin^2 C \cos^2 A$$

$$-\sin^2 A = \pm \sin^2 C$$

$$\frac{1}{2} \cos^2 C + \frac{1}{2} \sin^2 C + \frac{1}{2} \cos^2 C \pm \sin^2 C - \frac{1}{2} = \pm \sin^2 C$$

$$\cos^2 C + \sin^2 C + \sin^2 C - 1 = \sin^2 C$$

$$\cos^2 C + 1 - 2\sin^2 C + \sin^2 C - 1 = \sin^2 C$$

$$\cos^2 C = 2\sin^2 C$$

$$\therefore \frac{\sin^2 C}{\cos^2 C} = \frac{1}{2} \quad \therefore \tan C = \pm \frac{1}{\sqrt{2}} \quad \therefore \tan C = \frac{\sqrt{2}}{2}$$

$$12) \sin C = \frac{\sqrt{6}}{3} \quad \cos C = \frac{\sqrt{3}}{3}$$

$$\sin B = \sin(A+C) = \sin A \cos C + \cos A \sin C$$

$$= \frac{\sqrt{2}}{2} \cdot \frac{\sqrt{3}}{3} + \frac{\sqrt{3}}{2} \cdot \frac{\sqrt{6}}{3} = \frac{2\sqrt{6} + 3\sqrt{6}}{6}$$

$$S_{\triangle ABC} = \frac{1}{2} bc \sin A = 3$$

$$bc = 6\sqrt{2}$$

$$a^2 = b^2 + c^2 - 2bc \cos A$$

$$\therefore b = 2\sqrt{2}$$

AI Response:

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