Half-Angle Identities

$$\sin\frac{u}{2} = \pm\sqrt{\frac{1-\cos u}{2}}$$

$$\cos\frac{u}{2} = \pm\sqrt{\frac{1+\cos u}{2}}$$

Your answer will NOT be both $\pm$. The signs of sin(u/2) and cos(u/2) depend on the quadrant in which angle (u/2) lies.

$$\tan\frac{u}{2} = \frac{1-\cos u}{\sin u} = \frac{\sin u}{1+\cos u} = \pm\sqrt{\frac{1-\cos u}{1+\cos u}}$$

Ex. 1: Use the half-angle formula to find the exact values of …

a) sin105°

b) cos105°

c) tan105°

Ex. 2: Use the half-angle formula to find the exact values of …

a) $\sin\frac{\pi}{8}$

b) $\cos\frac{\pi}{8}$

c) $\tan\frac{\pi}{8}$

Ex. 3: Find the exact values of sin(u/2), cos(u/2) and tan(u/2) using the half-angle formulas.

$$\cos u = \frac{5}{13}, \quad \frac{3\pi}{2} < u < 2\pi$$