$$\sin\left(\frac{\pi}{12}\right) = \sin\left(\frac{\pi}{4} - \frac{\pi}{6}\right) = \sin\frac{\pi}{4}\cos\frac{\pi}{6} - \sin\frac{\pi}{6}\cos\frac{\pi}{4}$$

$$= \frac{1}{\sqrt{2}} \times \frac{\sqrt{3}}{2} - \frac{1}{2} \times \frac{1}{\sqrt{2}}$$

$$= \frac{\sqrt{3}-1}{2\sqrt{2}}$$

$$= \frac{\sqrt{6}-\sqrt{2}}{4}$$

$$z_1 - z_2 = 2^{\frac{1}{6}}\left(\left(\cos\frac{\pi}{12} - \cos\frac{9\pi}{12}\right) + i\left(\sin\frac{\pi}{12} + \sin\frac{9\pi}{12}\right)\right)$$

$$= 2^{\frac{1}{6}}\left(\left(\frac{\sqrt{6}+\sqrt{2}}{4} + \frac{\sqrt{2}}{2}\right) + i\left(\frac{\sqrt{6}-\sqrt{2}}{4} + \frac{\sqrt{2}}{2}\right)\right)$$

$$= 2^{\frac{1}{6}}\left(\frac{\sqrt{6}+\sqrt{2}+2\sqrt{2}}{4} + i\frac{\sqrt{6}-\sqrt{2}+2\sqrt{2}}{4}\right)$$

$$= 2^{\frac{1}{6}}\left(\frac{\sqrt{6}+3\sqrt{2}}{4} + i\frac{\sqrt{6}+\sqrt{2}}{4}\right)$$

$$|z_1 - z_2| = 2^{\frac{1}{6}}\sqrt{\left(\frac{\sqrt{6}+3\sqrt{2}}{4}\right)^2 + \left(\frac{\sqrt{6}+\sqrt{2}}{4}\right)^2}$$

$$= \frac{2^{\frac{1}{6}}}{4}\sqrt{6 + 6\sqrt{12} + 18 + 6 + 2\sqrt{12} + 2}$$

$$= 2^{-\frac{11}{6}}\sqrt{32 + 8\sqrt{12}}$$

$$= 2^{-\frac{11}{6}}\sqrt{32 + 16\sqrt{3}}$$

$$= 2^{-\frac{11}{6}} \times 4 \times \sqrt{2+\sqrt{3}}$$

$$= \underline{\underline{2^{\frac{1}{6}}\sqrt{2+\sqrt{3}}}}$$

$$(\approx 2.168)$$

too complex AND LONG.

LOOK AT SOLUTIONS ON DIAGRAM

but OK