

Find the exact value of $\cos(165)$

Solution:

$$\begin{aligned}\cos(165) &= \cos(180 - 15) = -\cos(15) = \\&= -\cos\left(\frac{30}{2}\right) = -\sqrt{\frac{1 + \cos(30)}{2}} = -\sqrt{\frac{1 + \frac{\sqrt{3}}{2}}{2}} = -\sqrt{\frac{2 + \sqrt{3}}{4}} = -\frac{1}{2}\sqrt{2 + \sqrt{3}}\end{aligned}$$

Answer:

$$\cos(165) = -\frac{1}{2}\sqrt{2 + \sqrt{3}}$$

This value is approximately ≈ -0.96592583