

$$\frac{19\pi}{12} = \frac{3\pi}{12} + \frac{16\pi}{12}$$

Warmup 4: Use the sum or difference formula to find the exact value of  $\tan \frac{19\pi}{12}$ .

$$\tan\left(\frac{19\pi}{12}\right)$$

$$\tan\left(\frac{\pi}{4} + \frac{4\pi}{3}\right)$$

$$\tan(A+B)$$

$$\frac{\tan A + \tan B}{1 - \tan A \cdot \tan B} = \frac{\tan \frac{\pi}{4} + \tan \frac{4\pi}{3}}{1 - \tan \frac{\pi}{4} \cdot \tan \frac{4\pi}{3}} = \frac{1 + \sqrt{3}}{1 - (1)(\sqrt{3})}$$

$$= \frac{(1 + \sqrt{3})(1 + \sqrt{3})}{(1 - \sqrt{3})(1 + \sqrt{3})} = \frac{1 + \sqrt{3} + \sqrt{3} + 3}{1 - 3} = \frac{4 + 2\sqrt{3}}{-2} \div -2 =$$

$$\boxed{-2 - \sqrt{3}}$$

or

$$\boxed{-\sqrt{3} - 2}$$