

19. $\tan\left(\frac{\pi}{2} - u\right) = \cot u$

$$\tan(A-B) = \frac{\tan A - \tan B}{1 + \tan A \tan B}$$

$$\frac{\tan \frac{\pi}{2} - \tan u}{1 + \tan \frac{\pi}{2} \tan u}$$

$$\frac{\sin\left(\frac{\pi}{2} - u\right)}{\cos\left(\frac{\pi}{2} - u\right)} = \frac{\cancel{\sin \frac{\pi}{2}} (\cos u) - \cancel{\cos \frac{\pi}{2}} \sin u}{\cancel{\cos \frac{\pi}{2}} \cos u + \cancel{\sin \frac{\pi}{2}} \sin u}$$

$$= \frac{\cos u}{\sin u} = \cot u$$

$$25. \sin(x - \pi) = -\sin x$$

$$\sin x \cos \pi - \sin \pi \cos x$$

Handwritten annotations: A purple arrow points from the π in $\cos \pi$ to a purple 0 above the minus sign. A purple arrow points from the π in $\sin \pi$ to a purple 0 above the minus sign. A purple (-1) is written below the $\cos \pi$ term.

$$= -\sin x$$

$$21. \sec\left(\frac{\pi}{2} - u\right) = \csc u$$

$$\frac{1}{\cos\left(\frac{\pi}{2} - u\right)} = \frac{1}{\underbrace{\cos\frac{\pi}{2}}_0 \cos u + \underbrace{\sin\frac{\pi}{2}}_1 \sin u} = \frac{1}{\sin u} = \csc u$$

$$\begin{aligned} 7. \sin \frac{19\pi}{12} &= \sin 285^\circ \\ &= -\sin 75^\circ \\ &= -\left(\frac{\sqrt{6} + \sqrt{2}}{4}\right) \end{aligned}$$

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$$\sin\left(\frac{19\pi}{12}\right) = \sin\left(\frac{A\pi}{3} + \frac{B\pi}{4}\right)$$

$$4A + 3B = 19 \quad \frac{4A\pi}{12} + \frac{3B\pi}{12}$$



$$\checkmark \quad \sin\left(\frac{\pi}{3} + \frac{5\pi}{4}\right)$$

$$= \sin\frac{\pi}{3} \cos\frac{5\pi}{4} + \cos\frac{\pi}{3} \sin\frac{5\pi}{4}$$

$$= -\sin\frac{\pi}{3} \cos\frac{\pi}{4} - \cos\frac{\pi}{3} \sin\frac{\pi}{4}$$

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

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

$$29. \cos\left(x + \frac{\pi}{6}\right) + \sin\left(x - \frac{\pi}{3}\right) = 0$$

$$\cancel{\cos x} \cos \frac{\pi}{6} - \sin \frac{\pi}{6} \sin x + \sin x \cos \frac{\pi}{3} - \cancel{\cos x} \sin \frac{\pi}{3}$$

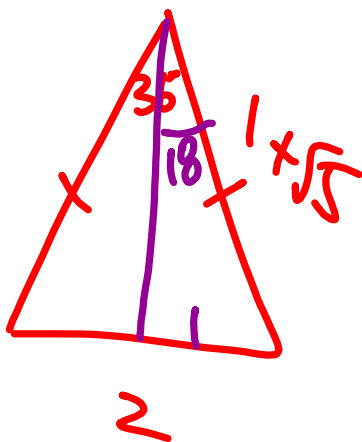
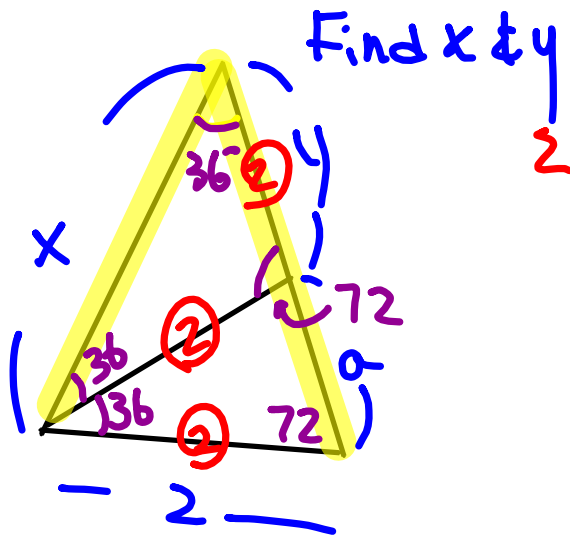
$$= 0$$

$$\underline{\sin 18^\circ}$$

$$\frac{2}{a} = \frac{2+a}{2}$$

$$4 = a^2 + 2a$$

$$5 = (a+1)^2 \quad a = \underline{\pm\sqrt{5} - 1} \quad a = \sqrt{5} - 1$$



$$\sin 18^\circ = \frac{1}{1+\sqrt{5}}$$