(23) sec 1275

$\cos 1275 = \cos 195 = \cos(240^\circ - 45^\circ)$

$= \cos 240 \cos 45 + \sin 240 \sin 45$

$= \left(-\frac{1}{2}\right)\left(\frac{\sqrt{2}}{2}\right) + \left(-\frac{\sqrt{3}}{2}\right)\left(\frac{\sqrt{2}}{2}\right)$

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

$\sec 1275 = \frac{4}{-\sqrt{2}-\sqrt{6}}\left(\frac{-\sqrt{2}+\sqrt{6}}{-\sqrt{2}+\sqrt{6}}\right) = \frac{4(-\sqrt{2}+\sqrt{6})}{2-6}$

$= \frac{\cancel{4}(-\sqrt{2}+\sqrt{6})}{-\cancel{4}_{-1}}$

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

18. tan 195°

$\tan(240-45) = \frac{\tan 240 - \tan 45}{1 + \tan 240 \tan 45}$

$= \frac{\sqrt{3} - 1}{1 + \sqrt{3}(1)} = \frac{\sqrt{3}-1}{1+\sqrt{3}} \cdot \left(\frac{1-\sqrt{3}}{1-\sqrt{3}}\right) = \frac{\sqrt{3} - 3 - 1 + \sqrt{3}}{1-3}$

$= \frac{-4+2\sqrt{3}}{-2}$

$= 2 - \sqrt{3}$

36. $\sin(\underset{\alpha}{A} + \underset{\beta}{\pi}) = -\sin A$

$\sin A \cos \pi + \cos A \sin \pi =$

$\sin A(-1) + \cancel{\cos A(0)} =$

$-\sin A = -\sin A$

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39. $\sin(A + B) = \dfrac{\tan A + \tan B}{\sec A \sec B}$

$\sin A \cos B + \cos A \sin B = \dfrac{\dfrac{\sin A}{\cos A} + \dfrac{\sin B}{\cos B}}{\dfrac{1}{\cos A \cos B}}$

$= \dfrac{\dfrac{\sin A}{\cos A}}{\dfrac{1}{\cos A \cos B}} + \dfrac{\dfrac{\sin B}{\cos B}}{\dfrac{1}{\cos A \cos B}}$

$= \dfrac{\sin A}{\cancel{\cos A}} \cdot \dfrac{\cancel{\cos A} \cos B}{1} + \dfrac{\sin B}{\cancel{\cos B}} \cdot \dfrac{\cos A \cancel{\cos B}}{1}$

$\sin A \cos B + \cos A \sin B = \sin A \cos B + \cos A \sin B$

42. $\sin(x+y)\sin(x-y) = \sin^2 x - \sin^2 y$

$(\sin x \cos y + \cos x \sin y)(\sin x \cos y - \cos x \sin y) =$

$\sin^2 x \cos^2 y - \cos^2 x \sin^2 y =$

$\sin^2 x(1-\sin^2 y) - (1-\sin^2 x)\sin^2 y =$

$\sin^2 x - \cancel{\sin^2 x \sin^2 y} - \sin^2 y + \cancel{\sin^2 x \sin^2 y} =$

$\sin^2 x - \sin^2 y = \sin^2 x - \sin^2 y$

$0° < x < 90°$

1. If $\sin x = \frac{2}{3}$, find $\cos x$.

2. If $\tan x = \frac{7}{2}$, find $\sin x$.