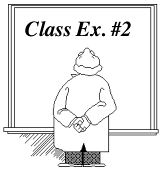
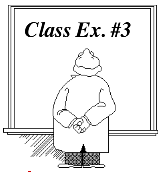


Class Ex. #2

Express 15° as a difference of two special angles and hence determine the exact value of sin 15° with a rational denominator.

$$\sin 15° = \sin(45°-30°) = \sin 45 \cos 30° - \cos 45° \sin 30°$$
$$= \left(\frac{\sqrt{2}}{2}\right)\left(\frac{\sqrt{3}}{2}\right) - \left(\frac{\sqrt{2}}{2}\right)\left(\frac{1}{2}\right)$$
$$= \frac{\sqrt{6}}{4} - \frac{\sqrt{2}}{4} = \boxed{\frac{\sqrt{6}-\sqrt{2}}{4}}$$

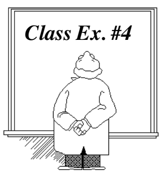


Class Ex. #3

Express $\frac{5\pi}{12}$ as a sum of two special angles and hence show that $\cot \frac{5\pi}{12} = \frac{\sqrt{3}-1}{\sqrt{3}+1}$.

$\frac{\pi}{2} = \frac{6\pi}{12}$ $\quad \frac{\pi}{3} = \frac{4\pi}{12}$ $\quad \frac{\pi}{4} = \frac{3\pi}{12}$ $\quad \frac{\pi}{6} = \frac{2\pi}{12}$

$$\frac{5\pi}{12} = \frac{\pi}{4} + \frac{\pi}{6}$$
$$\cot \frac{5\pi}{12} = \frac{1}{\tan \frac{5\pi}{12}}$$
$$\tan \frac{5\pi}{12} = \tan\left(\frac{\pi}{4}+\frac{\pi}{6}\right) = \frac{\tan \frac{\pi}{4} + \tan \frac{\pi}{6}}{1 - \tan \frac{\pi}{4} \tan \frac{\pi}{6}} = \frac{1+\frac{\sqrt{3}}{3}}{1-\frac{\sqrt{3}}{3}} = \frac{\frac{3+\sqrt{3}}{3}}{\frac{3-\sqrt{3}}{3}} = \frac{3+\sqrt{3}}{3-\sqrt{3}}$$
$$\cot \frac{5\pi}{12} = \frac{3-\sqrt{3}}{3+\sqrt{3}} \cdot \frac{3-\sqrt{3}}{3-\sqrt{3}} = \frac{9-6\sqrt{3}+3}{6} = \frac{12-6\sqrt{3}}{6} = \boxed{2-\sqrt{3}}$$



Class Ex. #4

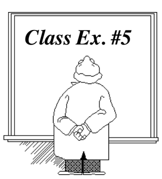
Simplify the following.

a) $\sin 100° \cos 10° - \cos 100° \sin 10°$ $= \sin(A-B)$

$$\sin(100°-10°) = \sin 90° = \boxed{1}$$

b) $\cos\left(\frac{1}{4}\pi - \theta\right) \cos\left(\frac{1}{4}\pi + \theta\right) - \sin\left(\frac{1}{4}\pi - \theta\right) \sin\left(\frac{1}{4}\pi + \theta\right)$ $= \cos(A+B)$

$$\cos\left(\left(\tfrac{1}{4}\pi-\theta\right)+\left(\tfrac{1}{4}\pi+\theta\right)\right) = \cos\frac{\pi}{2} = \boxed{0}$$



Class Ex. #5

Given $\cos A = \frac{3}{5}$ and $\cos B = \frac{5}{13}$, where $\underbrace{0 \le A \le \frac{\pi}{2}}_{}$ (I) and $\frac{3\pi}{2} \le B \le 2\pi$ (IV), find the exact value of $\cos(A + B)$.

$$= \cos A \cos B - \sin A \sin B$$
$$= \left(\frac{3}{5}\right)\left(\frac{5}{13}\right) - \left(\frac{4}{5}\right)\left(-\frac{12}{13}\right)$$
$$= \frac{15}{65} + \frac{48}{65}$$
$$= \boxed{\frac{63}{65}}$$

$\angle A$: $x = 3$, $y = 4$, $r = 5$

$5^2 = 3^2 + y^2$

$16 = y^2$

$\pm 4 = y$

$\sin A = \frac{4}{5}$

$\sin B = -\frac{12}{13}$

$\angle B$: $x = 5$, $y = -12$, $r = 13$

$13^2 = 5^2 + y^2$

$\sqrt{144} = \sqrt{y^2}$

$\pm 12 = y$

Complete Assignment Questions #1 - #12

#1-7, 10, 11