Advanced Math
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4) a) 0 b) $\frac{\sqrt{3}-1}{2}$ 12) $\sin 255° = \frac{-\sqrt{3}-1}{2\sqrt{2}}$ $\cos 225° = \frac{1-\sqrt{3}}{2\sqrt{2}}$ $\tan 225° = \frac{-\sqrt{3}-1}{1-\sqrt{3}}$

14) $\sin\frac{7\pi}{12} = \frac{\sqrt{3}+1}{2\sqrt{2}}$ $\cos\frac{7\pi}{12} = \frac{1-\sqrt{3}}{2\sqrt{2}}$ $\tan\frac{7\pi}{12} = \frac{\sqrt{3}+1}{1-\sqrt{3}}$

18) $\sin(30°-135°) = \frac{-1-\sqrt{3}}{2\sqrt{2}}$ $\cos(-105°) = \frac{1-\sqrt{3}}{2\sqrt{2}}$ $\tan(-105°) = \frac{-\sqrt{3}-1}{1-\sqrt{3}}$

20) $\sin\left(\frac{\pi}{4}+\frac{\pi}{2}\right) = \frac{\sqrt{3}+1}{2\sqrt{2}}$ $\cos\left(\frac{5\pi}{12}\right) = \frac{\sqrt{3}-1}{2\sqrt{2}}$ $\tan\left(\frac{5\pi}{12}\right) = \frac{\sqrt{3}+1}{\sqrt{3}-1}$

22) $\sin(190°)$ 24) $\cos(-10°)$ 26) $\tan(80°)$ 28) $\cos\left(\frac{12\pi}{35}\right)$

30) $\cos(3x-2y)$

32) $\frac{56}{65}$ 34) $\frac{33}{65}$ 36) $\frac{65}{53}$ 38) $-\frac{16}{63}$ 40) $\frac{4}{5}$ 42) $\frac{117}{125}$ 44) $\frac{125}{117}$

46) $\sin\left(\frac{\pi}{2}+x\right) = \sin\frac{\pi}{2}\cos x + \sin x\cos\frac{\pi}{2} = 1\cos x + 0\sin x = \cos x$ □

48) $\cos\left(\frac{5\pi}{4}-x\right) = \cos\frac{5\pi}{4}\cos(x) + \sin\left(\frac{5\pi}{4}\right)\sin x = -\frac{1}{\sqrt{2}}\cos x - \frac{1}{\sqrt{2}}\sin x = -\frac{1}{\sqrt{2}}(\cos x+\sin x)$
$= -\frac{\sqrt{2}}{2}(\cos x+\sin x)$ □

50) $\tan\left(\frac{\pi}{4}-\theta\right) = \frac{\tan\frac{\pi}{4}-\tan\theta}{1+\tan\frac{\pi}{4}\tan\theta} = \frac{1-\tan\theta}{1+\tan\theta}$ □

52) $\sin^2x-\sin^2y = \sin^2x(1)-\sin^2y(1) = \sin^2x(\sin^2y+\cos^2y)-\sin^2y(\cos^2x+\sin^2x)$
$= \sin^2x\sin^2y+\sin^2x\cos^2y-\sin^2y\sin^2x-\sin^2y\cos^2y$
$= \sin^2x\cos^2y-\sin^2y\cos^2x = (\sin x\cos y-\sin y\cos x)(\sin x\cos y-\sin y\cos x)$
$= \sin(x+y)\sin(x-y)$ □

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

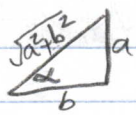
$= 2\cos x\cos y$ □

56) $\sin(n\pi+\theta) = \sin(n\pi)\cos\theta + \sin\theta\cos(n\pi)$; $\cos(n\pi)$ is either $+1$ or -1 depending on n, or $(-1)^n$

$= 0\cos\theta + (-1)^n\sin\theta = (-1)^n\sin\theta$ □

58) $a\sin B\theta + b\cos B\theta = \sqrt{a^2+b^2}\cos(B\theta - C)$ where $C = \tan^{-1}\left(\frac{a}{b}\right)$, $b>0$

$\sqrt{a^2+b^2}\left(\cos B\theta\cos C + \sin B\theta\sin C\right) = \sqrt{a^2+b^2}\left(\cos B\theta\cos\left(\tan^{-1}\left(\frac{a}{b}\right)\right) + \sin B\theta\sin\left(\tan^{-1}\left(\frac{a}{b}\right)\right)\right)$



$= \sqrt{a^2+b^2}\left(\cos(B\theta)\cdot\frac{b}{\sqrt{a^2+b^2}} + \sin(B\theta)\cdot\frac{a}{\sqrt{a^2+b^2}}\right) = \frac{a\sqrt{a^2+b^2}\sin B\theta}{\sqrt{a^2+b^2}} + \frac{b\sqrt{a^2+b^2}\cos B\theta}{\sqrt{a^2+b^2}}$

$= a\sin B\theta + b\cos B\theta$ □