Warm Up 3/12

1| $(1+\sqrt{3})(\sqrt{3}-1)$

$\sqrt{3} - 1 + 3 - \sqrt{3}$

$\boxed{2}$

2| $\frac{\pi}{4} + \frac{\pi}{3}$

$\frac{3\pi}{12} + \frac{4\pi}{12}$

$\frac{7\pi}{12}$

3| $(1+\sqrt{3})(\sqrt{3}+1)$

$\sqrt{3} + 1 + \sqrt{3}^2 + \sqrt{3}$

$4 + 2\sqrt{3}$

5.4 day 1 ex 1

Goal: Be able to calculate other trigonometric functions not on the unit circle exactly

Sum Identities

$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$

$\cos(\alpha+\beta) = \cos\alpha\cos\beta - \sin\alpha\sin\beta$

$\tan(\alpha+\beta) = \dfrac{\tan\alpha + \tan\beta}{1 - \tan\alpha\tan\beta}$

Difference identities

$\sin(\alpha-\beta) = \sin\alpha\cos\beta - \cos\alpha\sin\beta$

$\cos(\alpha-\beta) = \cos\alpha\cos\beta + \sin\alpha\sin\beta$

$\tan(\alpha-\beta) = \dfrac{\tan\alpha - \tan\beta}{1 + \tan\alpha\tan\beta}$

hint: for tangent use $\frac{\pi}{3}$ or 60° multiple if you can

$\sin(75^\circ) = \sin(300^\circ - 225^\circ)$

$\sin 300^\circ \cos 225^\circ - \cos 300^\circ \sin 225^\circ$

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

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

$\sin(75^\circ) = \sin(45^\circ + 30^\circ)$

$\sin 45^\circ \cos 30 + \cos 45 \sin 30$

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

$\frac{\sqrt{6} + \sqrt{2}}{4}$

$\tan\left(\frac{11\pi}{12}\right) = \tan\left(\frac{2\pi}{3} + \frac{\pi}{4}\right)$

$\frac{\tan\frac{2\pi}{3} + \tan\frac{\pi}{4}}{1 - \tan\frac{2\pi}{3}\tan\frac{\pi}{4}}$

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

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

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

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

47) $\cos 15^\circ$