HW 61 Review Evens

2. $= \sin 2(22.5°) = \boxed{\sin 45°} = \boxed{\frac{\sqrt{2}}{2}}$

4. $= \boxed{\cot^2 120°} = (\cot 120°)^2 = \left(\frac{1}{\sqrt{3}}\right)^2 = \boxed{\frac{1}{3}}$

6. $= \cos\left(\pi/6 + \pi/3\right) = \boxed{\cos \pi/2} = \boxed{0}$

8. $= \tan\left(\frac{660°}{2}\right) = \boxed{\tan 330°} = \boxed{-\frac{\sqrt{3}}{3}}$

10. $= \sin\left(\frac{600°}{2}\right) = \boxed{\sin 300°} = \boxed{-\frac{\sqrt{3}}{2}}$

12. $= -(\sin 75°) = -(\sin(45° + 30°))$

$= -(\sin 45° \cos 30° + \cos 45° \sin 30°)$

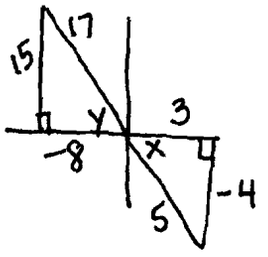
$= -\left(\frac{\sqrt{2}}{2} \cdot \frac{\sqrt{3}}{2} + \frac{\sqrt{2}}{2} \cdot \frac{1}{2}\right)$

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

14. $= \tan\left(\frac{315°}{2}\right) = \frac{1 - \cos 315°}{\sin 315°} = \frac{\left(1 - \frac{\sqrt{2}}{2}\right)(-2)}{\left(-\frac{\sqrt{2}}{2}\right)(-2)} = \frac{(-2+\sqrt{2})(\sqrt{2})}{(\sqrt{2})(\sqrt{2})}$

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

$= \boxed{-\sqrt{2} + 1}$



16. $\cos 2x = 2\cos^2 x - 1$

$= 2\left(\frac{9}{25}\right) - \frac{25}{25} = \boxed{\frac{-7}{25}}$

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

$= -\frac{4}{5} \cdot \frac{-8}{17} - \frac{3}{5} \cdot \frac{15}{17} = \boxed{\frac{-13}{85}}$

20. $\tan(y-x) = \dfrac{\tan y - \tan x}{1+\tan y \tan x} = \dfrac{\left[\frac{15}{-8} - \left(\frac{-4}{3}\right)\right]}{\left[1+\left(\frac{-15}{8}\right)\left(\frac{-4}{3}\right)\right]} = \dfrac{-45+32}{24+60}$

$= \boxed{\dfrac{-13}{84}}$

22. $\tan\frac{y}{2} = \dfrac{1-\cos y}{\sin y} = \dfrac{1-\left(\frac{-8}{17}\right)}{15/17} = 25/17 \cdot \frac{17}{15} = \boxed{5/3}$

24. $(\sec x - \tan x)(\csc x + 1)$

$= \sec x \csc x + \sec x - \tan x \csc x - \tan x$

$= \dfrac{1}{\cos x \sin x} + \dfrac{1}{\cos x} - \dfrac{\sin x}{\cos x}\cdot\dfrac{1}{\sin x} - \dfrac{\sin x}{\cos x}$

$= \dfrac{1-\sin^2 x}{\cos x \sin x}$

$= \dfrac{\cos^2 x}{\cos x \sin x}$

$= \dfrac{\cos x}{\sin x} = \boxed{\cot x}$

26. $\cos(x+\pi/4) - \cos(x-\pi/4) = 1$

$\cos x \cos\pi/4 - \sin x \sin\pi/4 - (\cos x \cos\pi/4 + \sin x \sin\pi/4) = 1$

$-2\sin x \sin\pi/4 = 1$

$-\cancel{2}\sin x \left(\dfrac{\sqrt{2}}{\cancel{2}}\right) = 1$

$\sin x = \dfrac{1}{-\sqrt{2}}$ $\quad x = \boxed{225^\circ, 315^\circ \;\; 5\pi/4, 7\pi/4}$

28. $\dfrac{\sec x - 1}{\sin^2 x} \equiv \dfrac{\sec^2 x}{1 + \sec x}$

$\dfrac{\sec x - 1}{1 - \cos^2 x}$

$\sec^2 x\,[\sec x - 1]$

$\sec^2 x\left[1 - \dfrac{1}{\sec^2 x}\right]$

$\dfrac{\sec^2 x\,(\sec x - 1)}{\sec^2 x - 1}$

$\dfrac{\sec^2 x\,(\sec x - 1)}{(\sec x + 1)(\sec x - 1)}$

30. $\cos 3x \equiv 4\cos^3 x - 3\cos x$

$\cos(2x + x)$

$\cos 2x \cos x - \sin 2x \sin x$

$(2\cos^2 x - 1)(\cos x) - (2\sin x \cos x)\sin x$

$2\cos^3 x - \cos x - 2\sin^2 x \cos x$

$2\cos^3 x - \cos x - 2(1 - \cos^2 x)\cos x$

$2\cos^3 x - \cos x - 2\cos x + 2\cos^3 x$

$4\cos^3 x - 3\cos x$