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

$2x+\sqrt{2}=0$

Dec. 3rd – NOTES **5.3 Solving Trig Equations** Solve each equation.

Restrict domain: $[0,2\pi)$

I. Collecting Like Terms

1. $\sin x+\sqrt{2}=-\sin x$

$2\sin x+\sqrt{2}=0$

$2\sin x=-\sqrt{2}$

$\sin x=-\frac{\sqrt{2}}{2}$

III IV $x=\frac{5\pi}{4},\frac{7\pi}{4}$

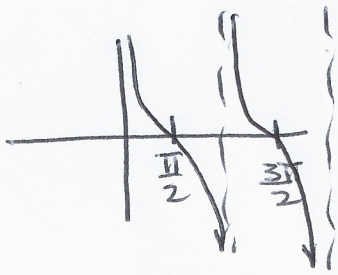
2. $\sqrt{3}\sec x+2=0$

$\sqrt{3}\sec x=-2$

$\sec x=\frac{-2}{\sqrt{3}}$

$\cos x=-\frac{\sqrt{3}}{2}$

II + III $x=\frac{5\pi}{6},\frac{7\pi}{6}$



II. Extracting Square Roots

3. $3\tan^2 x-1=0$

$3\tan^2 x=1$

$\tan^2 x=\frac{1}{3}$

$\sqrt{\tan^2 x}=\pm\frac{1}{\sqrt{3}}$

$\tan x=\pm\frac{1}{\sqrt{3}}$

$x=\frac{\pi}{6},\frac{5\pi}{6},\frac{7\pi}{6},\frac{11\pi}{6}$

III. Factoring out a GCF

4. $\cot x\cos^2 x=\cot x$

$\cot x\cos^2 x-\cot x=0$

$\cot x(\cos^2 x-1)=0$

$\cot x(\cos x+1)(\cos x-1)=0$

$\cot x=0$ $\quad \cos x+1=0$ $\quad \cos x-1=0$

$x=\frac{\pi}{2},\frac{3\pi}{2}$ $\quad \cos x=-1$ $\quad \cos x=1$

π $\quad 0$

$3x^2=3$

$3x^2-3=0$

$3($

IV. Factoring an Equation of Quadratic Type

Let $a=\sin x$

5. $2\sin^2 x-\sin x-1=0$

$2a^2-a-1=0$

$(2a+1)(a-1)=0$

$2a+1=0$ $\quad a-1=0$

$2a=-1$ $\quad a=1$

$a=-\frac{1}{2}$

$\sin x=-\frac{1}{2}$ $\quad \sin x=1$

III $x=\frac{7\pi}{6},\frac{11\pi}{6}$ $\quad x=\frac{\pi}{2}$

6. $2\cos^2 x+3\cos x+1=0$

$(2\cos x+1)(\cos x+1)=0$

$2\cos x+1=0$ $\quad \cos x+1=0$

$2\cos x=-1$ $\quad \cos x=-1$

$\cos x=-\frac{1}{2}$

$x=\frac{2\pi}{3},\frac{4\pi}{3}$ $\quad x=\pi$

V. Functions of Multiple Angles

$[0,2\pi)$

7. $\cos 3x=1$ → 3x around

$3x=0,2\pi,4\pi$

$x=0,\frac{2\pi}{3},\frac{4\pi}{3}$

8. $2\sin^2(2x)=1$ → 2x times around

$\sin^2 2x=\frac{1}{2}$

$\sin 2x=\pm\frac{1}{\sqrt{2}}=\pm\frac{\sqrt{2}}{2}$

$2x=\frac{\pi}{4},\frac{3\pi}{4},\frac{5\pi}{4},\frac{7\pi}{4}$

$\frac{9\pi}{4}$ $\frac{11\pi}{4}$ $\frac{13\pi}{4}$ $\frac{15\pi}{4}$

$x=\frac{\pi}{8},\frac{3\pi}{8},\frac{5\pi}{8},\frac{7\pi}{8},\frac{9\pi}{8},\frac{11\pi}{8},\frac{13\pi}{8},\frac{15\pi}{8}$

VI. Substituting Using Identitiy Formulas

9. $2\sin^2 x+3\cos x=3$

$2(1-\cos^2 x)+3\cos x-3=0$

$2-2\cos^2 x+3\cos x-3=0$

$-2\cos^2 x+3\cos x-1=0$

$2\cos^2 x-3\cos x+1=0$

$(2\cos x-1)(\cos x-1)=0$

$2\cos x-1=0$ $\quad \cos x-1=0$

$\cos x=\frac{1}{2}$ $\quad \cos x=1$

$x=\frac{\pi}{3},\frac{5\pi}{3}$ $\quad x=0$