Name: Key

5.3 practice (by skill)

Part 1: [Isolate the trigonometric expression & root]

1) Solve the equation.

$2+3\cos x-5=0$

$+5\ +5$

$-2 \qquad -2$

$\frac{3\cos x}{3}=\frac{3}{3}$

$\cos x=1$

$0+2n\pi$ or 2π

2) Solve the equation.

$0=\pi\sec x+\pi$

$-\pi \qquad -\pi$

$\frac{-\pi}{\pi}=\frac{\pi\sec x}{\pi}$

$-1=\sec x$

$-1=\cos x$

$\pi+2n\pi$

3) Solve the equation.

$5\tan^3 x-5=0$

$+5\ +5$

$\frac{5\tan^3 x}{5}=\frac{5}{5}$

$\sqrt[3]{\tan^3 x}=\sqrt[3]{1}$

$\tan x=1$

$\frac{\pi}{4}+2n\pi$

$\frac{5\pi}{4}+2n\pi$

4) Find all solutions on the interval $[0,2\pi)$

$0=2\sin x-1$

$+1 \qquad +1$

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

$\frac{\pi}{6},\frac{5\pi}{6}$

5) Find all solutions on the interval $[0,2\pi)$

$3\tan x-\sqrt{3}=0$

$+\sqrt{3}\ +\sqrt{3}$

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

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

$\frac{\pi}{6},\frac{7\pi}{6}$

6) Find all solutions on the interval $[0,2\pi)$

$\frac{3\cos^2 x}{3}=\frac{3}{3}$

$\sqrt{\cos^2 x}=\sqrt{1}$

$\cos x=\pm 1$

$0,\pi$

7) Solve the equation.

$-4=-6-\sqrt{3}\sec x$

$+6\ +6$

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

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

$\frac{5\pi}{6}+2n\pi$

$\frac{7\pi}{6}+2n\pi$

8) Find all solutions on the interval $[0,2\pi)$

$9\tan^2 x-3=0$

$+3\ +3$

$\frac{9\tan^2 x}{9}=\frac{3}{9}$

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

$\tan x=\pm\frac{1}{\sqrt{3}}\left(\frac{\sqrt{3}}{\sqrt{3}}\right)$

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

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

9) Solve the equation.

$3\cos x=\cos x-1$

$-\cos x \qquad -\cos x$

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

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

$\frac{2\pi}{3}+2n\pi$ and $\frac{4\pi}{3}+2n\pi$

Part 2: [Factoring]

10) Find all solutions on the interval $[0,2\pi)$

$2\cos^4 x-\cos^2 x=0$

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

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

$\cos x=0 \quad | \quad \cos x=\pm\frac{\sqrt{2}}{2}$

$\frac{\pi}{2},\frac{3\pi}{2} \quad | \quad \frac{\pi}{4},\frac{3\pi}{4},\frac{5\pi}{4},\frac{7\pi}{4}$

11) Find all solutions on the interval $[0,2\pi)$

$3\cot^4 x-24=\cot^2 x$

$3\cot^4 x-\cot^2 x-24=0$

$\cot^4 x-\cot^2 x-72=0$

$\left(\cot^2 x-9\right)\left(\cot^2 x+8\right)=0$

$\cot^2 x-9=0 \quad | \quad \cot^2 x+8=0$

$\cot^2 x=9 \quad | \quad \cot^2 x=-8$

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

12) Find all solutions on the interval $[0,2\pi)$

$2\sin^3 x=\sin x$

$2\sin^3 x-\sin x=0$

$\sin x\left(2\sin^2 x-1\right)=0$

$\sin x=0 \quad | \quad \sin^2 x=\frac{1}{2}$

$0,\pi \quad | \quad \sin x=\pm\frac{1}{\sqrt{2}}\left(\frac{\sqrt{2}}{\sqrt{2}}\right)$

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

$\frac{\pi}{4},\frac{3\pi}{4},\frac{5\pi}{4},\frac{7\pi}{4}$

13) Find all solutions on the interval $[0,2\pi)$

$\sqrt{3}\cos x\tan x-\cos x=0$

$\cos x\left(\sqrt{3}\tan x-1\right)=0$

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

$\tan x=\frac{1}{\sqrt{3}}$: $\frac{\pi}{6},\frac{7\pi}{6}$

14) Solve the equation.

$-\tan^2 x=-2\tan^4 x+15$

$2\tan^4 x-\tan^2 x-15=0$

$\left(\tan^2 x-\frac{5}{2}\right)\left(\tan^2 x+5\right)=0$

$\tan^2 x=\sqrt{3}$

$\tan^2 x+5=0$: no sol

$\tan x=\pm\sqrt{3}$: $\frac{\pi}{3},\frac{2\pi}{3},\frac{4\pi}{3},\frac{5\pi}{3}$

15) Find all solutions on the interval $[0,2\pi)$

$\sec x\csc^2 x=2\sec x$

$\sec x\left(\csc^2 x-2\right)=0$

$\sec x=0$: $\cos x=$ undefined — NO where!

$\csc^2 x=2$

$\csc x=\pm\sqrt{2}$

$\sin x=\pm\frac{1}{\sqrt{2}}\cdot\sqrt{2}$: $\frac{\pi}{4},\frac{3\pi}{4},\frac{5\pi}{4},\frac{7\pi}{4}$

Part 3: [Rewrite to use a single trig function; Pyth Ident]

$\cos^2 x+\sin^2 x=1$

16) Find all solutions on the interval $[0,2\pi)$

$-2\sin^2 x=-\cos x-1$

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

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

OR

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

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

$\left(\cos x-\frac{2}{2}\right)\left(\cos x+\frac{1}{2}\right)=0$

$\cos x=1$: 0

$\cos x=-\frac{1}{2}$: $\frac{2\pi}{3},\frac{4\pi}{3}$

$\sec^2\theta=1+\tan^2\theta$

17) Find all solutions on the interval $[0,2\pi)$

$\sec^2\theta+\tan\theta=1$

$1+\tan^2\theta+\tan\theta=1$

$\tan\theta\left(\tan\theta+1\right)=0$

$\tan\theta=0$: $0,\pi$

$\tan\theta=-1$: $\frac{3\pi}{4},\frac{7\pi}{4}$

$\cos^2 x+\sin^2 x=1$

18) Find all solutions on the interval $[0,2\pi)$

$\left(1-\sin^2 x\right)+5\sin x-7=0$

$\sin^2 x-5\sin x+6=0$

$\left(\sin x-3\right)\left(\sin x-2\right)=0$

$\sin x=3$ / $\sin x=2$: no solution!