

①

BONUS TRIGONOMETRY
ASSIGNMENT
943-DW APPLIED MATH
FALL 2011

① Solve for x

$$(a) \quad \frac{3x - 4\sec 56^\circ}{9x} = \csc 78^\circ$$

$$3x - 4\sec 56^\circ = 9\csc 78^\circ x$$

$$3x - 9\csc 78^\circ x = 4\sec 56^\circ$$

$$x(3 - 9\csc 78^\circ) = 4\sec 56^\circ$$

$$x = \frac{4\sec 56^\circ}{3 - 9\csc 78^\circ}$$

$$= \frac{\left(\frac{4}{\cos 56^\circ}\right)}{\left(3 - \frac{9}{\sin 78^\circ}\right)}$$

$$\approx \boxed{-1.15}$$

$$(b) \quad 2x - \csc 22^\circ = \frac{x \cot 56^\circ - 5}{\cos 77^\circ - 7x}$$

$$(2x - \csc 22^\circ)(\cos 77^\circ - 7x) = x \cot 56^\circ - 5$$

$$2\cos 77^\circ x - 14x^2 - (\csc 22^\circ)(\cos 77^\circ) + 7\csc 22^\circ x = x \cot 56^\circ - 5$$

$$-14x^2 + (7\csc 22^\circ - \cot 56^\circ + 2\cos 77^\circ)x + 5 - (\csc 22^\circ)(\cos 77^\circ) = 0$$

QUADRATIC

$$a = -14$$

$$b = 7\csc 22^\circ - \cot 56^\circ + 2\cos 77^\circ$$

$$\approx 18.64$$

$$c = 5 - \csc 22^\circ \cos 77^\circ$$

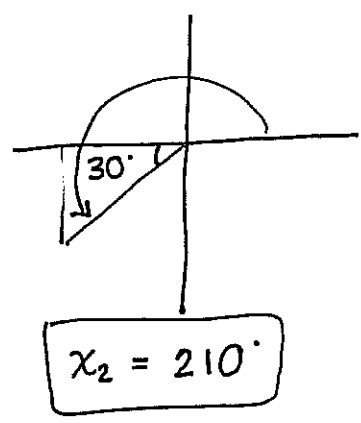
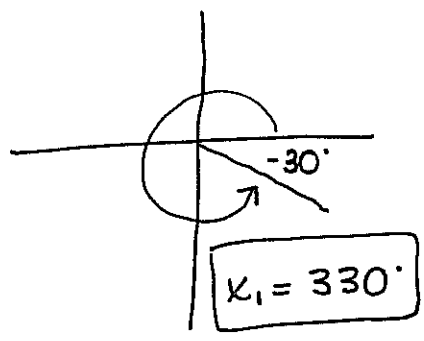
$$\approx 4.41$$

$$\boxed{x_1 = 1.54 \quad x_2 = -0.205}$$

② Solve for x with $0 \leq x < 360^\circ$

(a) $\sin x = -0.5$

$$x = \sin^{-1}(-0.5) = -30^\circ$$

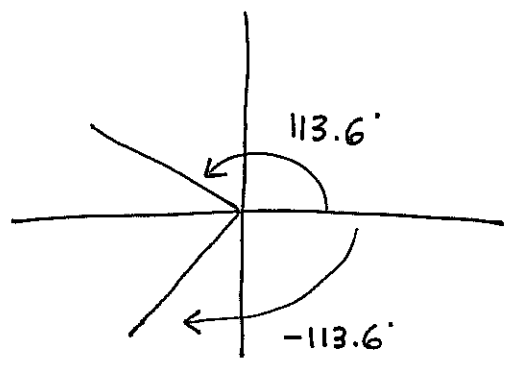


(b) $\sec x = -2.5$

$$\frac{1}{\cos x} = -2.5$$

$$\cos x = \left(-\frac{1}{2.5}\right)$$

$$x_1 = \cos^{-1}\left(\frac{-1}{2.5}\right) = 113.6^\circ$$



$$x_2 = 360^\circ - 113.6^\circ = 246.4^\circ$$

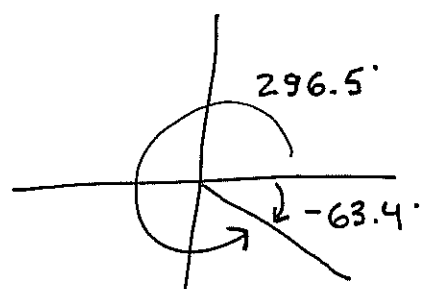
(c) $\sin x (2x-1) = 0$

$$\sin x = 0 \quad \text{OR} \quad 2x-1=0$$

$x_1 = 0^\circ$	$x_3 = \frac{1}{2}$
$x_2 = 180^\circ$	

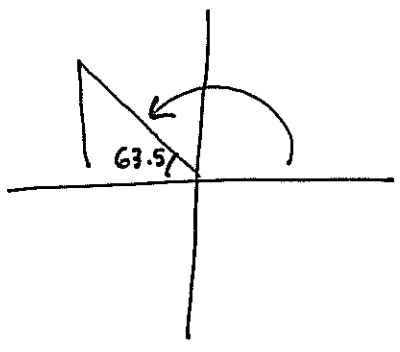
(d) $(\tan x + 2)(2x^2 - 2x - 4) = 0$

$\tan x + 2 = 0$ $2x^2 - 2x - 4 = 0$
 $\tan x = -2$ $2(x^2 - x - 2) = 0$
 $x = \tan^{-1}(-2)$ $2(x-2)(x+1) = 0$
 $= -63.4^\circ$



$x_1 = 296.5^\circ$

$x_3 = 2$
 $x_4 = -1$



$x_2 = 180^\circ - 63.5^\circ$
 $= 116.5^\circ$

(e) $5 \cos x - 6 = -\sec x$
 $5 \cos x - 6 = -\frac{1}{\cos x}$

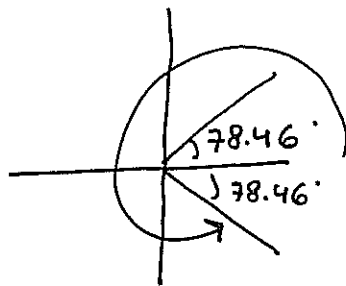
$5 \cos^2 x - 6 \cos x + 1 = 0$
 $(5 \cos x - 1)(\cos x - 1) = 0$

$\cos x = \frac{1}{5}$ $\cos x = 1$

$$\cos x = \frac{1}{5}$$

$$x = \cos^{-1}\left(\frac{1}{5}\right)$$

$$= 78.46^\circ$$

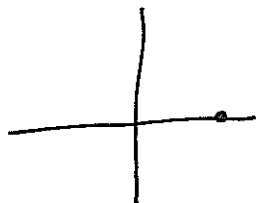


$$x_1 = 78.46^\circ$$

$$x_2 = 360^\circ - 78.46^\circ$$

$$= 281.5^\circ$$

$$\cos x = 1$$



$$x_3 = 0^\circ$$

(f) $\csc^4 x - 7 \csc^2 x + 10 = 0$

$$(\csc^2 x - 5)(\csc^2 x - 2) = 0$$

$$\csc^2 x = 5$$

$$\csc x = \pm \sqrt{5}$$

$$\sin x = \pm \frac{1}{\sqrt{5}}$$

$$x_1 = \sin^{-1}\left(\frac{1}{\sqrt{5}}\right)$$

$$= 44.4^\circ$$

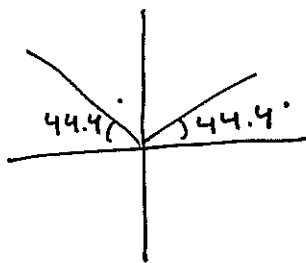
$$\csc^2 x = 2$$

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

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

$$x = \sin^{-1}\left(\frac{1}{\sqrt{2}}\right)$$

$$= 45^\circ$$



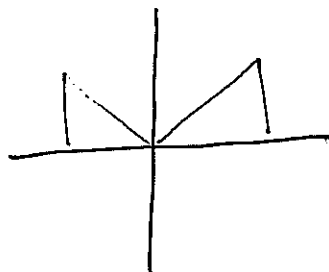
$$x_1 = 44.4^\circ$$

$$x_2 = 180^\circ - 44.4^\circ$$

$$= 135.6^\circ$$

$$x_3 = 224.6^\circ$$

$$x_4 = 316.6^\circ$$



$$x_6 = 135^\circ$$

$$x_7 = 225^\circ$$

$$x_8 = 315^\circ$$