(1) $\cos x \csc x = \cot x$

$\cos x \cdot \frac{1}{\sin x} = \frac{\cos x}{\sin x} = \cot x$ ✓

(2) $\frac{\sec x}{\cot x + \tan x} = \sin x$

$\frac{\frac{1}{\cos x}}{\frac{\cos x}{\sin x} + \frac{\sin x}{\cos x}} = \frac{1}{\cos x} \cdot \frac{\sin x \cos x}{\sin^2 x + \cos^2 x}$

$= \frac{\sin x \cos x}{\cos x} = \sin x$ ✓

(3) $\sin x \cos x (\tan x + \cot x) = 1$

$= \sin x \cos x \cdot \frac{\sin x}{\cos x} + \sin x \cos x \cdot \frac{\cos x}{\sin x}$

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

$= 1$ ✓

(4) $\sin x \cos 3\pi/2 - \cos x \sin 3\pi/2$

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

$= \cos x$ ✓

(5) $\cos(x + 3\pi/4) - \cos(x - 3\pi/4) = 0$

$\cos x \sin 3\pi/4 - \sin x \cos 3\pi/4 - (\cos x \sin 3\pi/4 + \sin x \cos 3\pi/4)$

$-2 \sin x \cos 3\pi/4 = 0$

$-2 \cdot -\sqrt{2}/2 \sin x = 0$

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

$\sin x = 0$

$x = 0, \pi$

(6) $\sin 2x - \cos x = 0$

$2\sin x \cos x - \cos x = 0$

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

$\cos x = 0 \qquad \sin x = 1/2$

$x = \pi/2, 3\pi/2 \qquad x = \pi/6, 5\pi/6$

(7) $\cos^2 x - 4\cos x + 1 = 0$ $\qquad \cos x = w$

$w = \dfrac{4 \pm \sqrt{16 - 4(1)(1)}}{2}$

$w = \dfrac{4 \pm \sqrt{12}}{2}$

$w = 2 \pm \sqrt{3}$

$w = 3.73 \qquad w = .2679$

$x = 1.2995$

$x = 4.9837$

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

$(\csc x - 2)(\csc x + 1) = 0$

$\csc x = 2 \qquad \csc x = -1$

$\sin x = 1/2 \qquad \sin x = -1$

$x = \pi/6, 5\pi/6, 3\pi/2$

(9) $\sin 3x = -1/2$

$\dfrac{3x}{3} = \dfrac{7\pi/6 + 2\pi n}{3} \qquad \dfrac{3x}{3} = \dfrac{11\pi/6 + 2\pi n}{3}$

$x = \dfrac{7\pi}{18} + \dfrac{2\pi n}{3} \qquad x = \dfrac{11\pi}{18} + \dfrac{2\pi n}{3}$

$x = 7\pi/18, 19\pi/18, 31\pi/18, 11\pi/18, 23\pi/18, 35\pi/18$

(10) $\tan x \sec x = 3\tan x$

$\tan x \sec x - 3\tan x = 0$

$\tan x (\sec x - 3) = 0$

$\tan x = 0 \qquad \sec x = 3$

$x = 0, \pi \qquad \dfrac{1}{\cos x} = 3$

$\cos x = 1/3$

$x = 1.23$

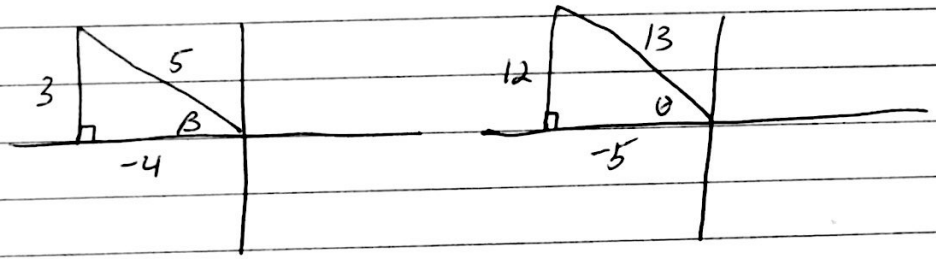
$x = 5.05$

(11) $\cos u/2$ : $u = \frac{10\pi}{8} = 5\pi/4$

$$\cos 5\pi/4/2 = -\sqrt{\frac{1+\cos 5\pi/4}{2}}$$

$$= -\sqrt{\frac{1-\sqrt{2}/2}{2}} = -\sqrt{\frac{2-\sqrt{2}}{2}}\cdot\frac{1}{2} = \boxed{\frac{-\sqrt{2-\sqrt{2}}}{2}}$$

(12) $\sin B = \frac{3}{5}$ $\cos\theta = -5/13$




a.) $\sin(B+\theta) = \sin B\cos\theta + \sin\theta\cos B$

$= 3/5 \cdot -5/13 + 12/13 \cdot -4/5$

$= -15/65 - 48/65$

$= -63/65$

b.) $\cos(B-\theta) = \cos B\cos\theta - \sin B\sin\theta$

$= -4/5 \cdot -5/13 + 3/5 \cdot 12/13$

$= +20/65 + 36/65$

$= +56/65$

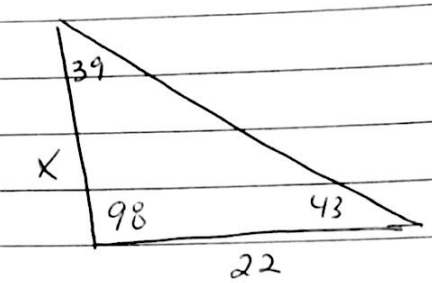
c.) $\tan(B+\theta) = \frac{\tan B + \tan\theta}{1-\tan B\tan\theta}$

$= \frac{-3/4 + 12/-5}{1-(-3/4)(-12/5)}$

$= \frac{-63/20}{4/5}$

$= 63/16$

(13)




$\frac{\sin 39}{22} = \frac{\sin 98}{6} = \frac{\sin 43}{x}$

~~$x = 7$ feet~~ $x = 23.8$ ft

(14) $s = \frac{(510 + 840 + 1120)}{2} = 1235$

$A = \sqrt{1235(725)(395)(115)}$

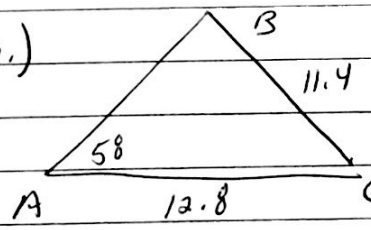
$A = 201674 \text{ yds}^2$

$A = 41.668$ acres

$\times \quad 2000$

$\$ 83,336.37$

(15) a.)



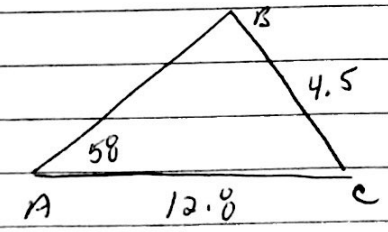

$\frac{\sin 58}{11.4} = \frac{\sin B}{12.8} = \frac{\sin C}{c}$

$B = 72.2$ or $B = 107.8$

$C = 49.8$ $C = 14.2$

$c = 10.3$ $c = 3.3$

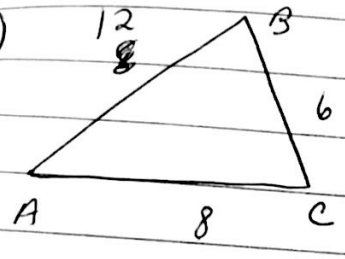
b.)




$\frac{\sin 58}{4.5} = \frac{\sin B}{12.8} = \frac{\sin C}{c}$

NO $\Delta$ exists

c.)




$\cos C = \frac{8^2+6^2-12^2}{2(8)(6)}$

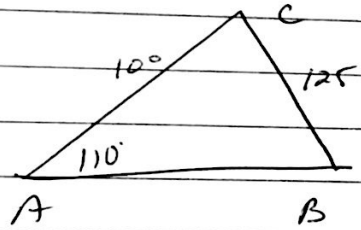
$C = 117.3°$

$\cos B = \frac{12^2+6^2-8^2}{2(12)(6)}$

$A = 26.4°$

$B = 36.3°$

d.)



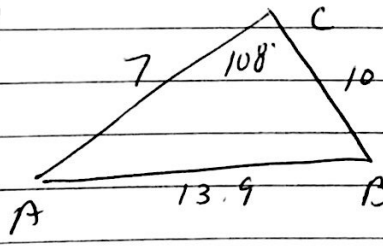

$\frac{\sin 110}{125} = \frac{\sin B}{100} = \frac{\sin C}{c}$

$B = 48.7°$

$C = 21.3°$

$c = 48.3$

e.)




$c^2 = 7^2+10^2-2(7)(10)\cos 108$

$c = 13.9$

~~B~~

$\frac{\sin 108}{13.9} = \frac{\sin B}{7}$

$B = 28.7$

$A = 43.3$