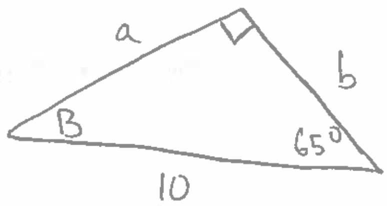
Homework 4 MATH 1540 Fall 2019

§7.2 #34

Given:



Find a

$$\sin(65°) = \frac{a}{10}$$

$\downarrow$ mult by 10

$$\boxed{a = 10\sin(65°)}$$

Find b

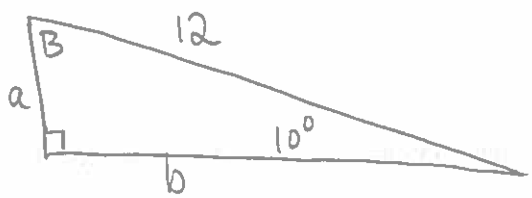
$$\cos(65°) = \frac{b}{10}$$

$\downarrow$ mult by 10

$$\boxed{b = 10\cos(65°)}$$

#35

Given:



Find a

$$\sin(10°) = \frac{a}{12}$$

$\downarrow$ mult by 12

$$\boxed{a = 12\sin(10°)}$$

Find b

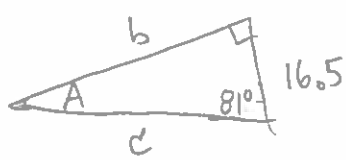
$$\cos(10°) = \frac{b}{12}$$

$\downarrow$ mult. by 12

$$\boxed{b = 12\cos(10°)}$$

#36

Given:



Find b

$$\tan(81°) = \frac{b}{16.5}$$

$\downarrow$ multiply by 16.5

$$\boxed{b = 16.5\tan(81°)}$$

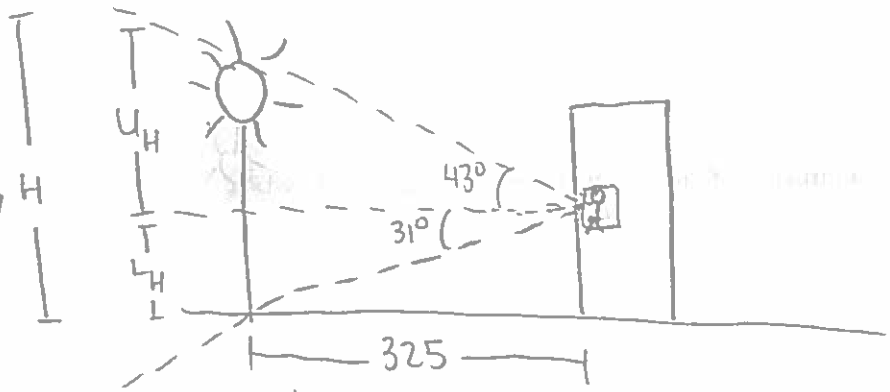
Find c

$$\cos(81°) = \frac{16.5}{c}$$

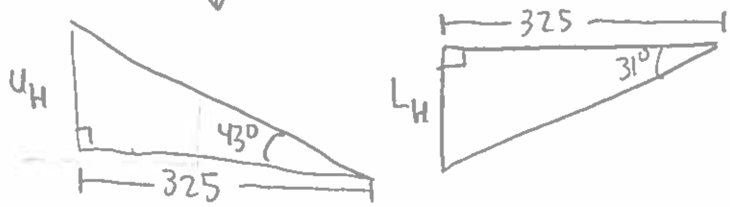
$\downarrow$ reciprocal

$$\frac{1}{\cos(81°)} = \frac{c}{16.5} \xrightarrow{\text{mult by } 16.5} \boxed{c = \frac{16.5}{\cos(81°)}}$$

#47



"extruct" the triangles



Call the height of the tower H split into U_H and L_H as drawn

We have from the diagram that $H = U_H + L_H$.

From the first Δ:

$$\tan(43^\circ) = \frac{U_H}{325}$$

$$\downarrow$$

$$U_H = 325\tan(43^\circ) \approx 303.1$$

From 2^{nd} Δ:

$$\tan(31^\circ) = \frac{L_H}{325}$$

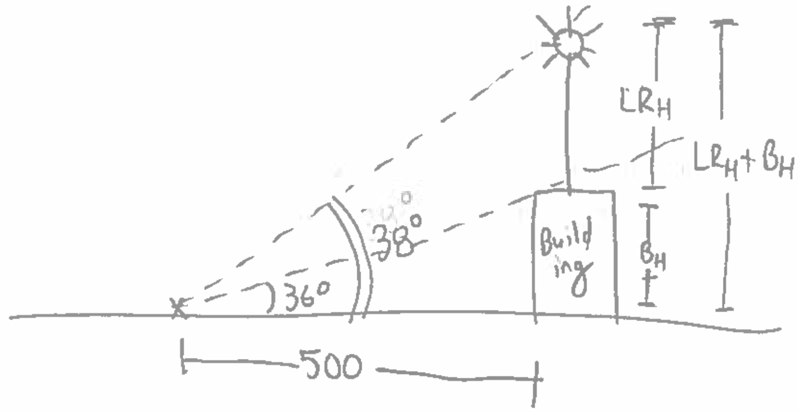
$$\downarrow$$

$$L_H = 325\tan(31^\circ) \approx 195.3$$

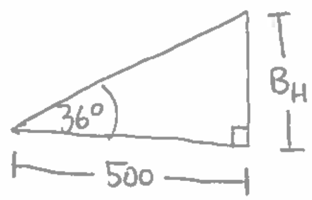
So the height of the antenna is

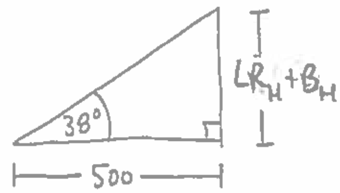
$$H = 303.1 + 195.3 = 498.4 \text{ ft}$$

#51)



"extract" the triangles





Find B_H

$$\tan(36°) = \frac{B_H}{500}$$

$$B_H = 500\tan(36°) \approx 363.3$$

Find $L_H + B_H$

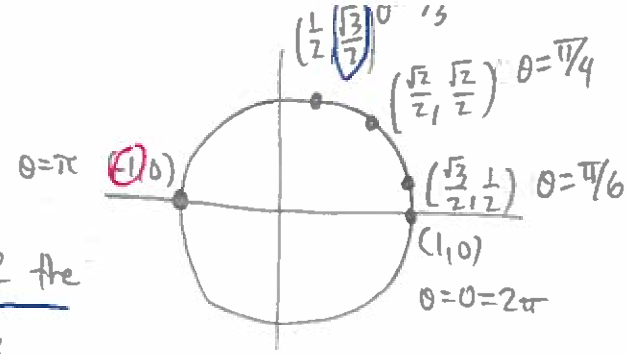
$$\tan(38°) = \frac{L_H + B_H}{500}$$

$$LR_H + B_H = 500\tan(38°) \approx 390.6$$

To find the height of the lightning rod — labeled LR_H — we need to subtract the height of the building — labelled B_H — from the total height of both the building and the lightning rod — labeled $LR_H + B_H$:

$$LR_H = (LR_H + B_H) - B_H = 390.6 - 363.3 = 27.3 \text{ feet}$$

§7.3



#11) $\sin\left(\frac{\pi}{3}\right) = $ 2nd coordinate of the point at $\theta = \pi/3$

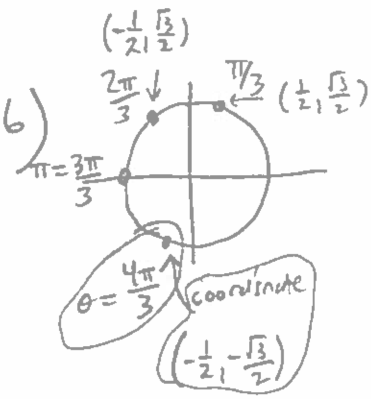
$= \frac{\sqrt{3}}{2}$

#19) $\cos(\pi) = $ 1st coordinate of the point at $\theta = \pi$ $= -1$

#29) $\frac{2\pi}{3}$ is in QII, so

ref $\angle = \pi - \frac{2\pi}{3} = \frac{\pi}{3}$

#46)



a) reference angle $= \theta - \pi$

$= \frac{4\pi}{3} - \frac{3\pi}{3}$

$= \frac{\pi}{3}$

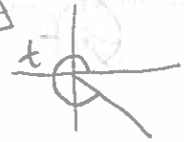
b) quadrant is QIII ($\Rightarrow$ sine is negative and cosine is negative)

c) $\sin\left(\frac{4\pi}{3}\right) = -\sin\left(\frac{\pi}{3}\right) = -\frac{\sqrt{3}}{2}$

b/c QIII   ref $\angle$

$\cos\left(\frac{4\pi}{3}\right) = -\cos\left(\frac{\pi}{3}\right) = -\frac{1}{2}$

#50) Given: $\cos(t) = \frac{1}{7}$, t in QIV



$\Rightarrow$ cosine positive, sine negative

Find: $\sin(t)$

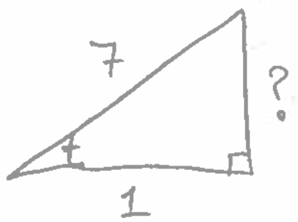
Soln: Draw a Δ to match "$\cos(t) = \frac{1}{7}$"

1 ← adjacent

7 ← hypotenuse

t ← angle

$\Downarrow$



find ? w/ Pyth thm $\Longrightarrow$

$$1^2 + ?^2 = 7^2$$

$$\downarrow$$

$$?^2 = 48$$

$$\downarrow$$

$$? = \sqrt{48}$$

Now we can find $\sin(t)$:

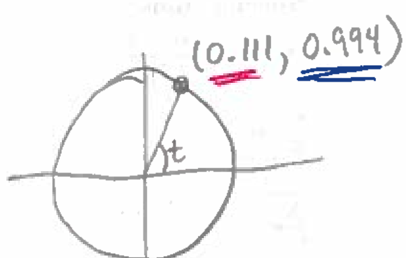
$$\sin(t) = -\frac{\sqrt{48}}{7}$$

$\sqrt{48}$ ← opposite

7 ← hyp.

negative b/c t is in QIV

#70) Given:



Find: $\sin(t)$ and $\cos t$

Soln: $\sin(t) = \boxed{\text{2nd coordinate of point at angle } t} = 0.994$

$\cos(t) = \boxed{\text{1st coordinate of point at angle } t} = 0.111$

#82) Use calculator to find $\sin\left(\frac{\pi}{10}\right)$

Soln: Don't forget to make sure in radian mode:

$$\sin\left(\frac{\pi}{10}\right) \approx 0.3090$$

#87) Use calculator to find $\cos(98^\circ)$

Soln: Don't forget to make sure in degree mode:

$$\cos(98^\circ) \approx -0.1391$$