

1. Evaluate:  $\sec\left(\frac{\pi}{2}\right)$   $\frac{1}{\cos\frac{\pi}{2}} = \frac{1}{0}$

**UND**

2. Let  $\theta$  be an angle in standard position, name the quadrant in which  $\theta$  lies. When  $\cos\theta < 0$  and  $\cot\theta > 0$ .

$\cos\theta = -\#$   $\cot = +\#$   
 QII & QIII    QI & QIII

**QIII**

3-7. Given  $\tan\theta = -\frac{1}{3}$ , and  $90^\circ < \theta < 180^\circ$ . Find the exact value of the remaining five trigonometric functions.

QII

$\tan\theta = \frac{y}{x} = \frac{-1}{3}$      $(-3)^2 + (1)^2 = r^2$   
 $9 + 1 = r^2$   
 $r = \sqrt{10}$

$\sin\theta = \frac{y}{r} = \frac{-1}{\sqrt{10}}$   
 $\cos\theta = \frac{x}{r} = \frac{-3}{\sqrt{10}}$

$\csc\theta = \frac{1}{\sin\theta} = -\sqrt{10}$   
 $\sec\theta = \frac{1}{\cos\theta} = -\frac{\sqrt{10}}{3}$   
 $\cot\theta = \frac{1}{\tan\theta} = -3$

8-9. Find a reference angle for  $\cot(-210^\circ)$ , and then evaluate using the reference angle.

$-210 + 360 = 150$

**ref L = 30°**

**$\cot(-210^\circ) = \sqrt{3}$**

$\cot 30^\circ = \frac{x}{y} = \frac{\frac{\sqrt{3}}{2}}{\frac{1}{2}} = \frac{\sqrt{3}}{2} \cdot \frac{2}{1} = \sqrt{3}$

$\cot 30^\circ = \sqrt{3}$

10-11. Find a reference angle for  $\sin\left(\frac{22\pi}{3}\right)$ , and then evaluate using the reference angle.

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

$\frac{22\pi}{3} - \frac{6\pi}{3} = \frac{16\pi}{3} - \frac{6\pi}{3} = \frac{10\pi}{3} - \frac{6\pi}{3} = \frac{4\pi}{3}$

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

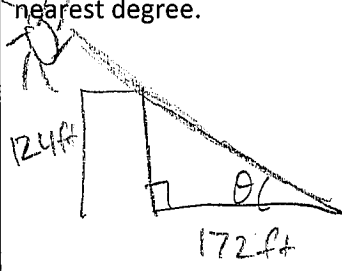
$\sin\frac{4\pi}{3} = -\frac{\sqrt{3}}{2}$

**$\sin\frac{22\pi}{3} = -\frac{\sqrt{3}}{2}$**

#1-11 are samples of what is on the no calculator portion of this test

#12-21 are samples of what is on the calculator allowed portion of the test.

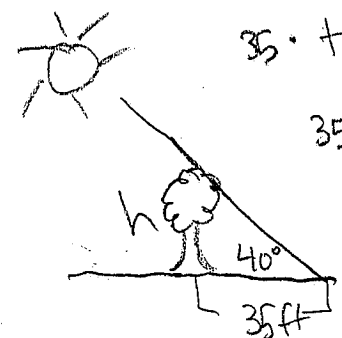
12-13. A tower that is 124 feet tall casts a shadow 172 feet long. Find the angle of elevation of the sun to the nearest degree.



$\tan^{-1}\left(\frac{124}{172}\right) = \tan^{-1}(0.721)$

**36°**

14-15. At a certain time of day, the angle of elevation of the sun is  $40^\circ$ . To the nearest foot, find the height of a tree whose shadow is 35 feet long.



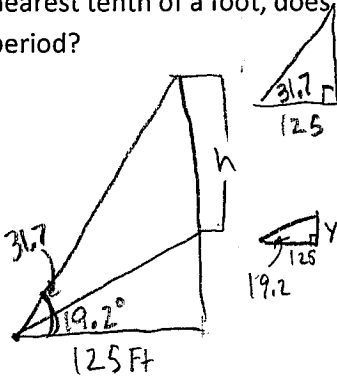
$35 \cdot \tan 40^\circ = \frac{h}{35} \cdot 35$

$35(0.839) = h$

$h = 29.36$

**29 ft**

16-17. A hot air balloon is rising vertically. From a point on level ground 125 feet from the point directly under the passenger compartment, the angle of elevation to the balloon changes from  $19.2^\circ$  to  $31.7^\circ$ . How far, to the nearest tenth of a foot, does the balloon rise during this period?



$$\tan 31.7 = \frac{x}{125}$$

$$125(0.618) = x$$

$$x = 77.25$$

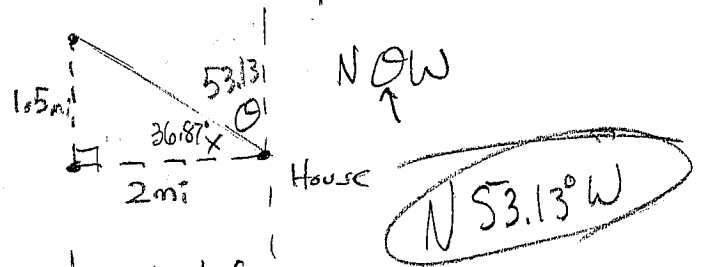
$$\tan 19.2 = \frac{x}{125}$$

$$125(0.348) = x$$

$$x = 43.5$$

$$h = 77.25 - 43.5 = 33.75 \text{ ft}$$

18-19. You leave your house and run 2 miles due west followed by 1.5 miles due north. At that time what is your bearing from your house?

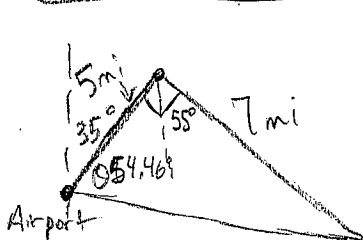


$$\tan x = \frac{1.5}{2}$$

$$\tan^{-1}\left(\frac{1.5}{2}\right) = x$$

$$x = 36.87^\circ$$

20-21. A jet leaves a runway whose bearing is  $N35^\circ E$  from the control tower. After flying 5 miles, the jet turns  $90^\circ$  and flies on a bearing of  $S55^\circ E$  for 7 miles. At that time, what is the bearing of the jet from the control tower?



$$\tan^{-1}\left(\frac{7}{5}\right) = 54.46$$

$$N 89.46^\circ E$$

