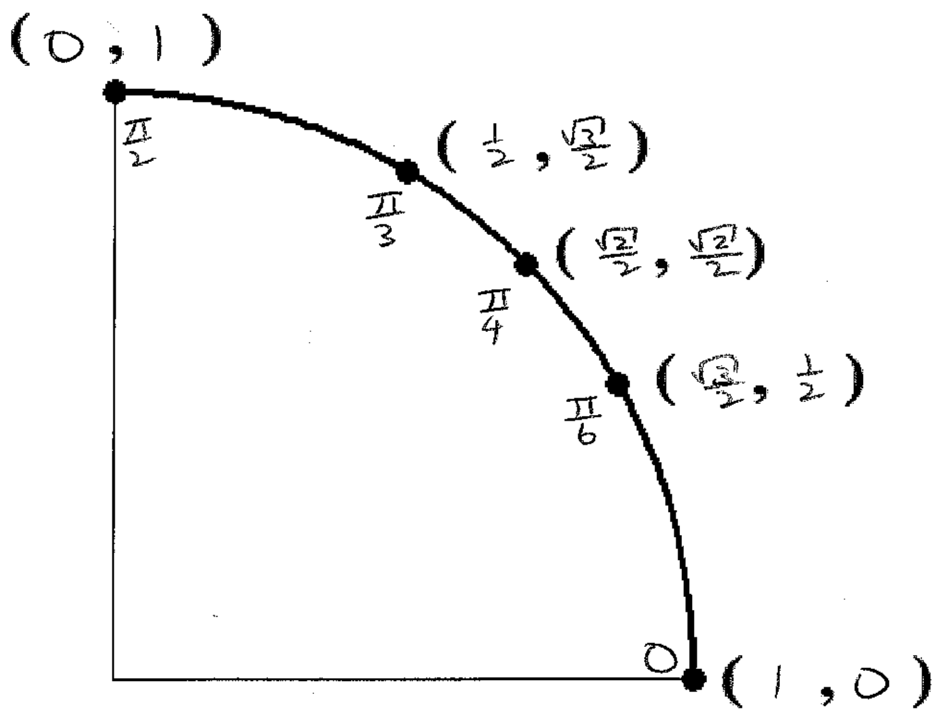
Complete the first quadrant portion of the unit circle below. Simplify all answers.
Inside the circle, label the radian measure of each point.
Outside the circle, label the corresponding $x-$ and $y-$coordinates of each point.

SCORE: _____ / 8 PTS
(2 POINTS OFF FOR EACH ERROR)



Let $\theta = -\frac{18\pi}{4}$. Fill in the blanks below. Simplify all answers.

SCORE: _____ / 11 PTS

[a] θ is coterminal with $\underline{\frac{3\pi}{2}}$ radians. $\boxed{\textbf{NOTE}\text{: Your answer must be between } 0 \text{ and } 2\pi}$. $-\frac{9\pi}{2} + 6\pi$

[b] The reference angle for θ is $\underline{\frac{\pi}{2}}$ radians.

[c] $\cot\theta = \underline{0}$. $\frac{0}{-1}$

[d] $\csc\theta = \underline{-1}$. $\frac{1}{-1}$

Suppose $\cos t = -\frac{\sqrt{3}}{2}$. Fill in the blanks below. Simplify all answers.

SCORE: _____ / 13 PTS

[a] The reference angle for t is $\underline{\frac{\pi}{6}}$ radians.

[b] t could be in quadrant(s) $\underline{2 \text{ or } 3}$.

[c] The possible value(s) of t is (are) $\underline{\frac{5\pi}{6} \text{ or } \frac{7\pi}{6}}$. $\boxed{\textbf{NOTE}\text{: Your answer(s) must be between } 0 \text{ and } 2\pi}$.

Prove the identity $(3+\cot t)(3-\cot t)=10-\csc^2 t$. SCORE: _____ / 10 PTS

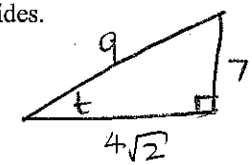
$= 9-\cot^2 t$

$= 9-(\csc^2 t-1)$

$= 10-\csc^2 t$

Let t be an acute angle such that $\csc t=\frac{9}{7}$. Fill in the blanks below. Simplify all answers. SCORE: _____ / 8 PTS

[a] Draw a corresponding right angle triangle, and label the lengths of all sides.



$\sqrt{9^2-7^2}=\sqrt{81-49}$
$=\sqrt{32}$
$=4\sqrt{2}$

[b] $\tan t=$ $\frac{7\sqrt{2}}{8}$. $\frac{7}{4\sqrt{2}}\cdot\frac{\sqrt{2}}{\sqrt{2}}$

[c] $\cos t=$ $\frac{4\sqrt{2}}{9}$.

Let θ be an angle such that $\cos\theta=\frac{2\sqrt{10}}{7}$ and $\sin\theta=-\frac{3}{7}$. Fill in the blanks below. Simplify all answers. SCORE: _____ / 12 PTS

[a] $\csc\theta=$ $-\frac{7}{3}$. $\frac{1}{-\frac{3}{7}}$

[b] $\cos(-\theta)=$ $\frac{2\sqrt{10}}{7}$. $\cos\theta$

[c] $\tan\theta=$ $\frac{-3\sqrt{10}}{20}$. $\frac{-\frac{3}{7}}{\frac{2\sqrt{10}}{7}}=-\frac{3}{2\sqrt{10}}\cdot\frac{\sqrt{10}}{\sqrt{10}}$

[d] $\sec(\frac{\pi}{2}-\theta)=$ $-\frac{7}{3}$. $\csc\theta$

Suppose $\sec t=\frac{9}{5}$ and $\sin t<0$. Fill in the blanks below. Simplify all answers. SCORE: _____ / 10 PTS

[a] t is in quadrant 4. $x>0, y<0$

[b] Find the value of $\tan t$ using identities, **not triangles**. **NOTE**: You must show the proper use of identities to get full credit.

$\tan^2 t=\sec^2 t-1$
$=\frac{81}{25}-1$
$=\frac{56}{25}$

$\tan t=\frac{-2\sqrt{14}}{5}$ SINCE $\tan t<0$ IN Q_4

Fill in the blanks.

SCORE: _____ / 6 PTS

[a] An angle of $\frac{18\pi}{5}$ radians has a reference angle of $\underline{\quad \frac{2\pi}{5} \quad}$ radians. $3\frac{3}{5}\pi$

[b] $\csc(-17.8) = \underline{\ 1.1531\ }$. $\boxed{\text{Round your answer to 4 decimal places.}}$

A merry-go-round is spinning at 15 revolutions per minute, and its outer edge has a linear speed of 600 feet per minute.

SCORE: _____ / 12 PTS

[a] Find the angular speed of the edge of the merry-go-round, and the radius of the merry-go-round.
$\boxed{\text{Show proper work. State the units of your final answers. Round your answer to 2 decimal places.}}$

$15 \text{ REVOLUTIONS} = 15 \cdot 2\pi^R = 30\pi^R$

$\omega = \frac{30\pi^R}{\text{MINUTE}}$

$v = r\omega \longrightarrow r = \frac{v}{\omega} = \frac{\overset{20}{\cancel{600}}\text{ FT}}{\cancel{\text{MINUTE}}} \cdot \frac{\cancel{\text{MINUTE}}}{\cancel{30}\pi^R} = \frac{20}{\pi}\text{ FT} \approx 6.37\text{ FT}$

[b] A sector of the merry-go-round was painted red, and had an area of 68 square feet. Find the central angle of the red sector.
$\boxed{\text{Show proper work. State the units of your final answer. Round your answers to 2 decimal places.}}$

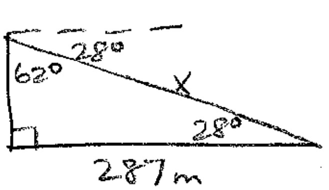
$A = \frac{1}{2}r^2\theta^R$

$\theta^R = \frac{2A}{r^2} = \frac{2(68\text{ FT}^2)}{(6.37\text{ FT})^2} \approx 3.35^R$

A funicular transports passengers from the entrance of a cave to the bottom of the cave along an inclined track.

SCORE: _____ / 10 PTS

The bottom of the cave is 287 meters to the east of the entrance, and is at an angle of depression of 28° from the entrance.
How long is the funicular's track ? $\boxed{\text{Show proper work. State the units of your final answer. Round your answer to 2 decimal places.}}$



$\cos 28^\circ = \frac{287\text{ m}}{x} \longrightarrow x = \frac{287\text{ m}}{\cos 28^\circ}$

OR

$\sin 62^\circ$

$\approx 325.05\text{ m}$