Below you will find 10 problems, each worth 10 points. Solve the problems in the space provided. When writing a solution to a problem, show all work. No books or notes are allowed. Sign and submit your formula sheet with the exam.

**Problem 1.** Convert the units as indicated:

(a) 12.35° to degrees, minutes and seconds.

(b) \( \frac{7\pi}{72} \) (radians) to degrees, minutes and seconds.
Problem 2. Find two positive coterminal angles and one negative coterminal angle for each of the following angles:

(a) $200^\circ$ (use degrees);

(b) $-\frac{5\pi}{6}$ (use radians).

Problem 3. An angle $\theta$, in standard position, is located in the third quadrant and has $\tan \theta = \frac{5}{12}$. Find $\sin \theta$ and $\cos \theta$. (HINT. Use the given information to find the signs for $\sin \theta$ and $\cos \theta$ first. Then use the fundamental identities.)

Problem 4. Find the exact values of $\sin \left( -\frac{2\pi}{3} \right)$ and $\cos \left( -\frac{2\pi}{3} \right)$. 
Problem 5. Find the length of the arc that subtends the angle $150^\circ$ on a circle of diameter 12 in.

Problem 6. Prove the identity:

$$\sin^2 t (\csc^2 t - 1) = \cos^2 t.$$ 

Problem 7. The angle $\theta$ is an acute angle in the right triangle shown in the figure.

Find all six trigonometric functions of $\theta$. 

![Right triangle with sides 40 and 32 and angle $\theta$]
Problem 8. Find the exact values of $t$, in the interval $[0, 3\pi]$, which satisfy the equation 
\[ \sin t = \frac{\sqrt{3}}{2}. \]

Problem 9. Find the side labeled $x$ in the right triangle:

\begin{center}
\begin{tikzpicture}
\draw (0,0) -- (4,0) -- (4,4\sqrt{3}) -- cycle;
\filldraw (4,0) circle (1pt);
\draw (4,0) -- (4,0.5);
\node at (4.2,0.25) {$x$};
\node at (4,4.5) {$4\sqrt{3}$};
\draw (4,0) -- (4,4\sqrt{3});
\node at (2,2) {$30^\circ$};
\end{tikzpicture}
\end{center}

Problem 10. Let $\theta$ be an angle in standard position, such that the point $P(-15, 8)$ is on its terminal side. Find all the six trigonometric functions of $\theta$