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) $98.765^\circ$ to degrees, minutes and seconds.

(b) $\frac{11\pi}{24}$ (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) $-130^\circ$ (use degrees);

(b) $\frac{7\pi}{6}$ (use radians).

Problem 3. An angle $\theta$, in standard position, is located in the third quadrant and has $\cot \theta = \frac{12}{5}$. Find the exact values of $\sin \theta$ and $\cos \theta$.

Problem 4. Find the exact values of $\sin \left(-\frac{7\pi}{4}\right)$ and $\cos \left(-\frac{7\pi}{4}\right)$. 
Problem 5. Find the length of the arc that subtends the angle $100^\circ$ on a circle of diameter 8 in. You can give your answer either as a decimal (rounded to two decimal places), or as a fraction of $\pi$.

Problem 6. Prove the identity:

$$\tan t (\csc^2 t - 1) = \cot t.$$

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

Find the exact values of all six trigonometric functions of $\theta$. 

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\begin{array}{c}
 65 \\
 \theta \\
 52 \\
\end{array}
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**Problem 8.** Find the exact values of $t$, in the interval $[-4\pi, 2\pi]$, which satisfy the equation

$$ \cos t = \frac{\sqrt{2}}{2}. $$

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

![Right Triangle]

**Problem 10.** Let $\theta$ be an angle in standard position, such that the point $P(-2, 5)$ is on its terminal side. Find the exact values of all the six trigonometric functions of $\theta$. 