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.** (a) Write the complex number \( w = -8 - 8\sqrt{3}i \) in trigonometric form \( w = r\text{cis} \theta \), with \( 0 \leq \theta \leq 2\pi \).

(b) Using part (a) find all complex solutions of the equation \( z^4 = w \). Write all solutions in the form \( a + bi \), with \( a, b \) real numbers.
Problem 2. In parts (a) and (b) below, find the area of $\triangle ABC$, based on the given information. (Use {\textbf{exact}} values.)

(a) $a = 8$, $b = 6$, $\hat{C} = 30^\circ$.

(b) $a = 5$, $b = 6$, $c = 7$.

Problem 3. Find all solutions of the equation $\sin 5t + \sin 3t = 0$. (Use {\textbf{exact}} values.)

Problem 4. A triangle $ABC$ has $a = 3$ in, $b = 4$ in, and $\hat{A} = 30^\circ$. Find the remaining parts: $\hat{B}$, $\hat{C}$, and $c$. (Express all angles in degrees. Round to two decimal places.)
Problem 5. A triangle $ABC$ has $a = 10$ in, $b = 4$ in, and $\hat{C} = 45^\circ$. Find the remaining parts: $c$, $\hat{A}$, and $\hat{B}$. (Express all angles in degrees. Round to two decimal places.)

Problem 6. A triangle $ABC$ has $a = 6$ in, $b = 7$ in, and $c = 8$ in. Find the remaining parts: $\hat{A}$, $\hat{B}$, and $\hat{C}$. (Express all angles in degrees. Round to two decimal places.)

Problem 7. Verify the identity: $\frac{\sin 4t + \sin 2t}{\cos 4t + \cos 2t} = \tan 3t$. 
Problem 8. A triangle $ABC$ has $a = 3$ in, $\hat{B} = 30^\circ$, and $\hat{C} = 45^\circ$. Find the remaining parts: $\hat{A}$, $b$, and $c$. (Express all angles in degrees. Round to two decimal places.)

Problem 9. Find the exact value of $\tan \left( \frac{1}{2} \arccos \left( -\frac{5}{13} \right) \right)$.

Problem 10. Find the solutions of the equation $3 \tan^2 t + 5 \tan t - 2 = 0$, that are in the interval $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$. (Use radians. Round to two decimal places.)