Instructions: Please justify all your answers. No partial credit will be awarded for answers without calculations or explanations. You may Not use any electronic technology. Please sign your name below signifying that you have read and understood these directions and will not cheat.

Your Signature: ________________________________
Problem 1: \( \tan(\theta) = \frac{12}{5} \) with \( \theta \) in the third quadrant. Find the exact values for all of the remaining 5 circular functions of \( \theta \).
Problem 2: Factor the polynomial $p(x) = 4x^3 - 7x^2 + 2x + 1$ and graph $p(x)$. Make sure to label the roots and the y-intercept.
Problem 3: Find the exact value of \( \sec\left(\frac{7\pi}{12}\right) \).
Problem 4: Consider the equation

\[ 9x^2 - 4y^2 - 36x - 24y - 36 = 0 \]

(1) Put the equation in standard form and identify as a type of conic section.

(2) Graph the equation, label the focus or foci, the directrix, the vertices or vertex etc.
Problem 5: Solve the equation and describe all the solutions that lie in the interval \([0, 2\pi]\).

\[\sin(x) + \cos(x) = 1\]
Problem 6: Solve the inequality.

\[(\log(x))^2 < 2\log(x) + 15\]
Problem 7: (Let \( f(x) = x^3(10 - 7x + x^2) \).

(1) Determine the values of \( x \) for which \( f(x) \geq 0 \) and express your answer in interval notation.

(2) Express the domain of the function \( g(x) = \frac{1}{\sqrt{f(x)}} \) in interval notation.
**Problem 8:** The function \( f(x) = -1 + \sqrt[3]{4x - 5} \) is one to one on its domain.

1. Describe the domain and range of \( f(x) \) in interval notation.
2. Find a formula for its inverse, call it \( g(x) \).
3. Describe the domain and range of \( g(x) \).
4. Verify that your formula is correct by computing and simplifying \( f \circ g(x) \).
Problem 9: Consider the rational function

\[ f(x) = \frac{3x^2 - 3x}{x^2 - 5x + 4} \]

(1) Express the domain of \( f(x) \) in interval notation.
(2) Find the \( x \) and \( y \) intercepts of \( f(x) \).
(3) Find all vertical and horizontal asymptotes.
(4) Sketch a detailed graph of \( f(x) \).
Problem 10: Use the method of transformations to sketch a detailed graph of each of following functions. First sketch the basic function and then sketch its transformation. Label all asymptotes and intercepts.

(1) Basic: $y = \log(x)$ and Transformed: $y = 4 - \log(2x + 1)$.
(2) Basic: $y = \sqrt{x}$ and Transformed: $y = 1 - \sqrt{1 - x}$. 