Math 1300–Sumer Precalculus Final Exam

Your Name: _____

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: _____

Question	1	2	3	4	5	6	7	8	9	10	Total
Possible Points	20	20	20	20	20	20	20	20	20	20	200
Your Scores											

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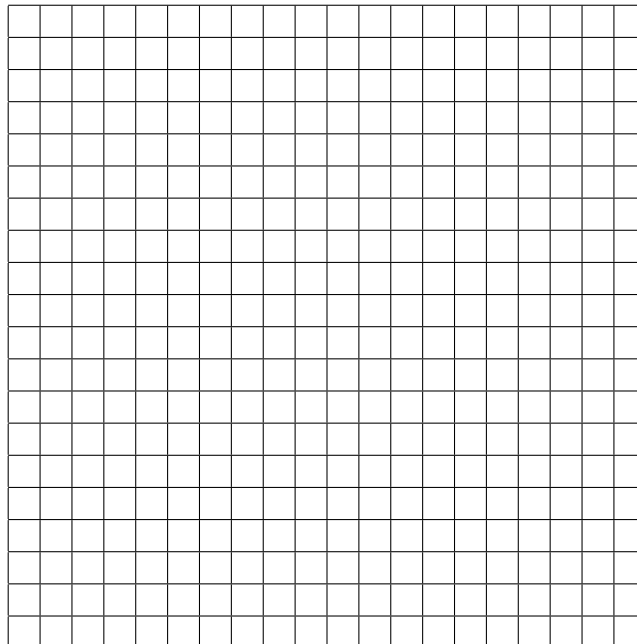
Problem 2: Factor the polynomial $p(x) = 4x^3 - 7x^2 + 2x + 1$ and graph $p(x)$. Make sure to label the roots and the y-intercept.

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 $[0, 2\pi)$.

$$\sin(x) + \cos(x) = 1$$

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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 $f(x)$.
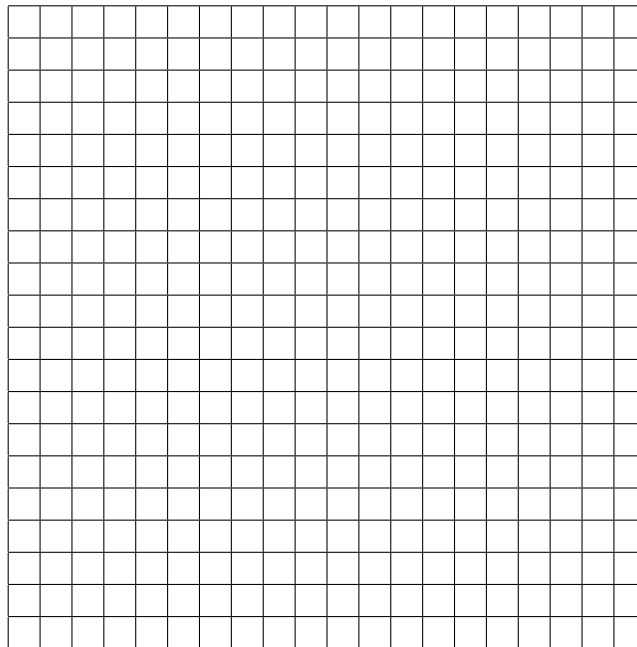
Problem 10: Use the method of transformations to sketch a detailed graph of each of following functions. First sketch the basic function and then sketch its transformation. Label all asymptotes and intercepts.

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

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