Show all your work. **Numerical answers without explicit explanations and computations will not be graded.**

1. Express $\frac{1}{3} \ln x - 8 \ln y + \ln w$ as a single logarithm.

2. Sketch one period of $y = \sin(2x)$. Be sure to indicate the amplitude, period, and at least 4 points in your sketch.

3. Sketch one period of $y = 4 \cos(x + \pi/4)$. Be sure to indicate the amplitude, period, and at least 4 points in your sketch.

4. Verify the identity $\frac{1}{\sec x \tan x} = \csc x - \sin x$.

5. Find the domain of $f(x) = \frac{7}{\sqrt{x - 25}}$.

6. Sketch the graph of $f(x) = x^3 - 3x^2$. Indicate the zeros, the $y$-intercept, and the end-behavior of the graph.

7. Express the $(4 - i) - 5i$ in the form $a + bi$.

8. Express $\frac{1 - i}{2 + 2i}$ in the form $a + bi$.

9. Find $f \circ g$ and $g \circ f$ where $f(x) = \sqrt{x - 3}$ and $g(x) = x^2$.

10. Find $f^{-1}$ where $f(x) = \frac{x - 3}{x + 2}$

11. Graph the rational function $f(x) = \frac{x}{x^2 - 1}$. Be sure to indicate all the intercepts and asymptotes in your sketch.
12. Factor the polynomial $f(x) = x^4 + 16$ completely over the complex numbers.

13. Sketch the graph of $f(x) = e^x + 3$. Indicate the $y$-intercept and the horizontal asymptote.

14. Sketch the graph of $g(x) = \ln(x + 3)$. Indicate the $x$-intercept and the vertical asymptote.

15. Solve the equation $2 - 6 \ln x = 10$. You can express your answer in terms of $e$. 