Name:
Instructor:

Please show all work and simplify all answers completely

1. (10 pts) \( x^2 - 3x + 6 > 2x \)
   (a) Find critical values
   
   (b) solve for \( x \)

2. (10 pts) \( \frac{x+2}{x-1} \leq \frac{x+5}{x-3} \)
   (a) find critical values
   
   (b) solve for \( x \)

3. (5 pts) \( f(x) = 2x + 1, g(x) = x^2 + 2 \) find \( (g \circ f)(x) \)
4. (5 pts) $f(x) = \frac{3x+2}{x+1}$  find $f^{-1}(x)$

5. (5 pts) Find $\log_3(243)$

6. (5 pts) Convert $5^3 = 125$ to a logarithmic equation

7. (5 pts) Express as a single logarithm: $2 \log_a(x) + 3 \log_a(y) - 2 \log_a(3z)$

8. (5 pts) Express in terms of $\log_a(x)$ and $\log_a(y)$: $\log_a((x^{-1}y^2)^3)$

9. (5 pts) Solve $3^{2x} = 5^{-x}$

10. (5 pts) Solve $\log_2(x + 1) + \log_2(x + 3) = 3$
11. (5 pts) Simplify \(2e^{2\ln(2x+1)}\)

12. (5 pts) Find the doubling time for an initial investment of 5,000 under continuous compounding if the annual interest rate is 2.8\% (Hint: \(A(t) = Pe^{rt}\))

13. (15 pts) \(f(x) = 3^{x+1} - 5\)  
   (a) Suppose we know that \(g(x) = 3^{x+1}\) has horizontal asymptote \(y = 0\), find horizontal asymptote for \(f\) (Using your knowledge of shifts)

   (b) \(x\)-intercepts and \(y\)-intercepts

   (c) graph \(f(x)\) (label all intercepts and asymptotes)
14. (15 pts) Given $f(x) = \frac{2x-8}{x^2-9}$

(a) find all asymptotes

(b) find $x$-intercepts and $y$-intercepts.

(c) graph $f(x)$ (label all asymptotes and intercepts)