In preparation for your EXAM 4, please make sure you have completed the following:

A. Finish all MML homework. Do the review questions in MML.
B. Practice the questions assigned from the book (attached to your syllabus).
C. Review your in-class quizzes.
D. Work through the questions below.

EXAM 4 covers sections P.6 part 2, 3.6, 1.5 part 2, 4.1, 4.2, and 4.3

1. Find the function of the form \( f(x) = ca^x \) that contains the two given graph points, \((0, 1)\) and \((5, 25)\).

2. Evaluate \( f(-1) \) for \( f(x) = \left( \frac{1}{25} \right)^{x-1} \).

3. Evaluate \( f(0) \) for \( f(x) = \left( \frac{1}{25} \right)^{x-1} \).

4. Evaluate \( f\left( \frac{3}{2} \right) \) for \( f(x) = \left( \frac{1}{25} \right)^{x-1} \).

5. Rewrite the function \( f(x) = \left( \frac{1}{25} \right)^{x-1} \) as an exponential function with base 5.

6. Write the equation of the graph of \( y = 12^x \) if it is reflected on the y-axis and shifted 8 units up.

7. Write the equation of the graph of \( y = 18^x \) if it is reflected on the x-axis and shifted 5 units down.

8. How much should a couple invest at the time their son is born to provide him with $50,000 for his college tuition if the interest is 8% compounded quarterly? (Assume he will be 18 when he goes to college.)

9. How much should a couple invest at the time their son is born to provide him with $50,000 for his college tuition if the interest is compounded continuously at 3.5%? (Assume he will be 18 when he goes to college.)

10. Write \( \frac{1}{2^2} = 9 \) in logarithmic form.

11. Write \( \log_6 216 = 3 \) in exponential form.

12. Evaluate \( \log_7 \frac{1}{343} \).
13. Evaluate \( e^{\frac{1}{2} \ln 49} \).

14. Find the vertical asymptote and the domain of \( f(x) = \log_{4}(x-9) \).

15. Write \( \ln \left( \frac{5x^3}{e^{6\sqrt{x}}} \right) \) in expanded form. Where possible, evaluate the expression without using a calculator.

16. Write \( 4 \log x - \frac{1}{5} \log(x^2 - 3) - 2 \log(x+6) \) in condensed form.

17. Write \( 5 \log_{4}(w-2) - 3 \log_{5}(x+4) + \frac{1}{2} \log_{3} y \) in condensed form.

18. Use the change-of-base formula to evaluate \( \log_{8} 50 \).

19. Evaluate \( 5^{2 \log_{3} 3 - \log_{3} 4} \).

20. Evaluate \( e^{3 \ln 2 + 2 \ln 3} \).

21. Evaluate \( \log_{14} 1 \).

22. Evaluate \( \log_{23} 23^9 \).

23. The decay rate of a chemical is 8.2% per year. Find the half-life.

24. The half-life of a chemical is 21 years. Find the decay rate.

25. Given \( \log m = 8 \), \( \log p = 4 \) and \( \log 3 = .5 \), evaluate \( \log \left( \frac{\sqrt{m}}{3p^2} \right) \).

26. Find the function of the form \( f(x) = ca^x \) that contains the two graph points \((0, 3)\) and \((2, 12)\).

27. The function \( f(x) = 70e^{-0.3x} + 30 \) describes the percentage of information that a particular person remembers \( "x" \) weeks after learning the information. Find the percentage remembered at the moment it is first learned \((x=0)\). Find the percentage of information that is remembered after 15 weeks.

28. Find the domain of the function \( h(x) = \frac{2x+3}{x^2 + 3x - 10} \).

29. Find the vertical asymptotes, if any, of the function \( g(x) = \frac{(x-5)(x+2)}{(2x-3)(x+7)} \).

30. Find the vertical asymptotes, if any, of the function \( h(x) = \frac{x^2 - 6x + 8}{x^2 + x - 20} \).

31. Let \( f(x) = \frac{4x-3}{x+5} \).
   a. Find the domain.
b. Find the vertical asymptote(s).

c. Find the horizontal asymptote, if any.

d. Find the x-intercept(s), if any.

e. Find the y-intercept.

32. Let \( g(x) = \frac{3x^2 + 6x}{x^2 + x - 6} \).

a. Find the vertical asymptote(s).

b. Find the horizontal asymptote, if any.

c. Find the x-intercept(s), if any.

d. Find the y-intercept.

33. Find the vertical and horizontal asymptotes of the function \( h(x) = \frac{5x}{x^2 - 1} \).

34. Find the vertical and horizontal asymptotes of the function \( g(x) = \frac{4x + 7}{3x - 2} \).

35. Solve the inequality \( 2x^2 - x \leq 3 \). Write your final answer in interval notation.

36. Solve the rational inequality \( \frac{x^2 - 4}{x + 3} > 0 \). Write your final answer in interval notation.

37. Solve the rational inequality \( \frac{x - 2}{x + 5} \leq 2 \). Write your final answer in interval notation.

38. Solve the inequality \( (x - 2)^2(x + 1) \leq 0 \). Write your final answer in interval notation.

39. At what annual rate of return, compounded continuously, would your investment double in seven years?