

Math 2412 Review 2

Sketch the graphs of the following polynomial functions.(1-4) **Label the zeros and y-intercept.**

1. $f(x) = -\frac{1}{1296}(x+1)^2(x-2)^3(x-6)^4$

2. $f(x) = x^3 + x^2 - 4x - 4$

3. $f(x) = -x^4 + 16x^2$

4. $f(x) = 3x^4 + 15x^3$

Sketch the graphs of the following rational functions.(5-8) **Label asymptotes and intercepts.**

5. $f(x) = \frac{x-4}{x^2-4}$

6. $f(x) = \frac{3x-3}{x-2}$

7. $f(x) = \frac{2x^2-x-3}{2x+3}$

8. $f(x) = \frac{2x^2-x-3}{2x-3}$

Solve the following inequalities by completing the sign charts, and expressing the solution in interval notation.(9-12)

9. $(x-2)(x-5) > 0$

10. $x^3 \leq x$

11. $\frac{x^2-4x+4}{x^2-7x+6} < 0$

12. $\frac{1}{1-x} \geq \frac{3}{x}$

13. Approximate a solution of the polynomial equation $\underbrace{x^4-3x^2-1}_{f(x)} = 0$ using the Bisection

Method by completing the following table:

Left Endpoint(sign)	Midpoint(sign)	Right Endpoint(sign)	Error Bound
1(-)	$\frac{3}{2}$ (-)	2(+)	$\frac{1}{2}$
$\frac{3}{2}$ (-)	$\frac{7}{4}$ (-)	2(+)	$\frac{1}{4}$

Find partial fraction decompositions for the following.(14-16)

14. $\frac{3x-4}{(x-1)(x-2)}$

15. $\frac{4x^2-11x+9}{(x-1)^2(x-2)}$

16. $\frac{3x^2-x+1}{x(x^2+1)}$

17. The first step in finding the partial fraction decomposition of $\frac{5x^2+5x+1}{x^2+x}$ would be to

divide the numerator by the denominator. Perform this division.

Sketch the graphs of the following exponential and logarithmic functions. Indicate the asymptotes and intercepts.(18-21)

18. $g(x) = 5^{x-1}$

19. $g(x) = \left(\frac{1}{2}\right)^x - 2$

20. $g(x) = -\log_4(x+1) + 2$

21. $g(x) = \log_4(1-x)$

Find the **exact simplified value** of the following expressions.(22-29)

22. $\log_8 1$

23. $\log_2(16^{99})$

24. $\log_{10}\left(\frac{10^{100}}{10^{106}}\right)$

$$25. \log_3(\sqrt[70]{3}) \quad 26. \log_{10}(\log_{10}(10^{100})) \quad 27. 2^{\log_2 \pi} \quad 28. \log_8 3 - \log_8 \frac{3}{16}$$

$$29. \log_2\left(\frac{1}{2}\right) + \log_2\left(\frac{2}{3}\right) + \log_2\left(\frac{3}{4}\right) + \log_2\left(\frac{4}{5}\right) + \cdots + \log_2\left(\frac{126}{127}\right) + \log_2\left(\frac{127}{128}\right)$$

Expand the following logarithmic expressions as much as possible. Simplify if possible.

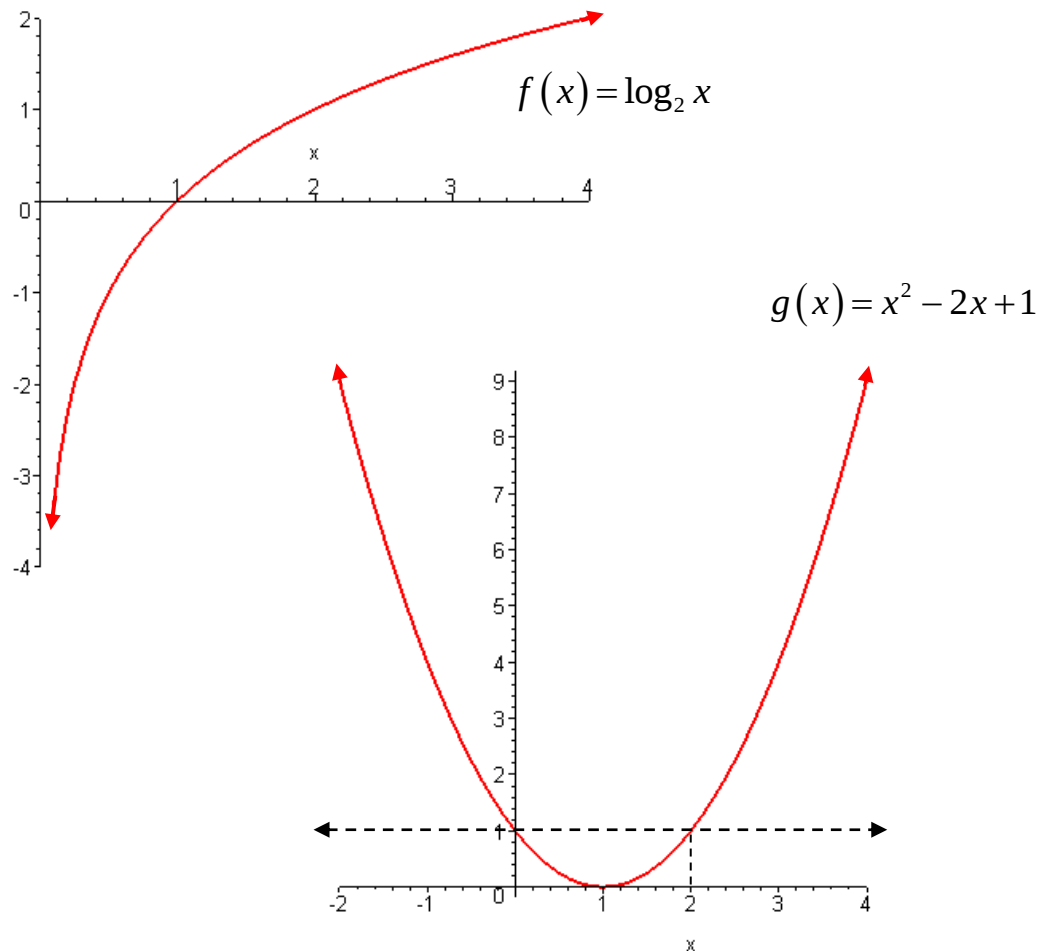
$$30. \log_2(xy^{10}) \quad 31. \log_2\left(\frac{x^2}{8y^3}\right)$$

Compress the following logarithmic expressions into a single term. Simplify if possible.

$$32. \log_{10} 6 + 4\log_{10} x \quad 33. \log_{10}(x-2) + \log_{10}(x+2) - \frac{1}{2}\log_{10}(x^2+4)$$

34. Evaluate $\log_4 15$ using a calculator to four decimal places.

35. Solve the inequality $\log_2(x^2 - 2x + 1) > 0$. You may use the given graphs of $f(x) = \log_2 x$ and $g(x) = x^2 - 2x + 1$, if you like.



Solve the following equations. (36-48)

$$36. 4^{1-2x} = 2 \quad 37. 3^{x^2 - \frac{1}{2}x} = \sqrt{3} \quad 38. 9^{2x} = 27^{3x-4} \quad 39. 25^{2x} = 5^{x^2-12}$$

$$40. 4^{2x} + 5 \cdot 4^x - 14 = 0 \quad 41. \log_3 \sqrt{x-2} = 2 \quad 42. \log_x 64 = -3 \quad 43. \log_{\sqrt{2}} x = -6$$

$$44. \log_6(x+3) + \log_6(x+4) = 1 \quad 45. \log_{10}(7x-12) = 2\log_{10} x$$

$$46. 8 = 4^{x^2} \cdot 2^{5x} \quad 47. \log_2 x + \log_2(x-2) = \log_2(x+4) \quad 48. \log_{10}(2x) - \log_{10}(x-3) = 1$$