◦ Algebra II Review
Midterm (Chapters 7 & 8)

Chapter 7

Simplify each radical.

1. $\sqrt{9x^{10}}$

2. $\sqrt[4]{x^{16}y^4}$

3. $\sqrt[3]{-64}$

4. $\frac{3}{\sqrt{5}}$

Multiply and simplify

5. $\sqrt[3]{25xy^8} \bullet \sqrt[3]{5x^4y^3}$

6. $\frac{\sqrt[3]{192x^8}}{\sqrt[3]{3x}}$

7. $\sqrt{18x^3} \bullet \sqrt{2x^2y^3}$

8. $\sqrt[5]{x^{-4}y}$

9. $(7 + 2\sqrt{3})(5 - \sqrt{3})$

10. $\frac{4}{3\sqrt{3}-2}$

11. $2\sqrt{27} + \sqrt{48}$

12. $27^{-\frac{2}{3}}$

13. $x^{\frac{1}{6}} \bullet x^{\frac{1}{3}}$

Solve each equation. Check for extraneous solutions.

14. $7 + \sqrt{2x-1} = 10$

15. $4(x-9)^{1/3} = 8$

16. $\sqrt{2x-1} = x - 8$

17. $(4x+3)^{2/3} = (16x+44)^{1/3}$

18. A circular table is to be made that will have a top covered with material that costs $3.50 per square foot. The covering is to cost no more than $60. What is the maximum radius for the top of the table?

19. If $f(x) = 2x^2 + 3$ and $g(x) = 3x - 1$, find (and state the domain of):

    a) $f(x) + g(x)$
    b) $f(x) - g(x)$
    c) $f(x) \bullet g(x)$
    d) $\frac{f(x)}{g(x)}$

20. Find $(f \circ g)(x)$ and $(g \circ f)(x)$ for the above functions.

21. Find $f[g(2)]$ and $g[f(2)]$ for the above functions.

Use $f(x) = 2x + 5$ and $g(x) = x^2 - 3x + 2$ for problems 22 and 23.

22. Find $4f(x) + 2g(x)$

23. Find $(f \circ g)(-3)$ and $(g \circ f)(-3)$

24. Find the inverse of the function $f(x) = 4x - 7$. Is the inverse a function?

25. Find the inverse of $y = \sqrt{x+9}$. Is the inverse a function?

26. Graph $y = x^2 - 2$ and its inverse. Is the inverse a function?

27. If $f(x) = 4x - 3$, what is $(f^{-1}(f(10))$?

Chapter 8

28. Without graphing, determine whether each function represents exponential growth or exponential decay.

a. $y = 1.023(0.98)^x$ b. $y = 8(\frac{13}{10})^x$

29. What is an asymptote?

30. Graph each function:

a. $y = 3^x$ b. $y = \log_4 x$

31. Evaluate $e^{5/2}$

32. Find the amount in a continuously compounded account if you invest $950 at an annual rate of 6.5% for 10 years.

33. An investment company promises to double your money in 14 years. Assuming continuous compounding of interest, what rate of interest is needed?

34. An element has a half-life of 30 hours. Write an exponential function for a 100 mg sample. Find the amount of the element remaining after 50 hours.

35. Write each equation in logarithmic form.

a. $(1/2)^4 = \frac{1}{16}$ b. $2^{-5} = \frac{1}{32}$

36. Evaluate each logarithm

a. $\log_4 2$ b. $\log 10000$ c. $\log_8 16$

37. Explain the differences between the graphs of $y = 2^x$, $y = 2^{x+2} - 1$, and $y = 2^{x-3} + 4$

38. Given the graph, write possible equations for f(x) and g(x).

39. Expand this logarithm: $\log \frac{5x}{4y}$

Use the properties of logarithms to evaluate the following expressions:

40. $3\log_3 3 - \log_3 3$

41. $\log_9 \frac{1}{3} + 3\log_9 3$

42. $\frac{1}{2}\log_5 1 - 2\log_5 5$

43. $7^{x-3} = 25$

44. $6^{3x+1} = 215$

45. Solve: $\log_2 4x = 5$

46. Solve: $\ln 3x = 6$

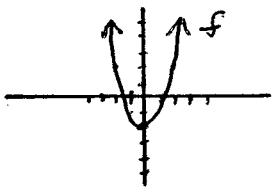
47. Solve: $e^{3x} = 12$

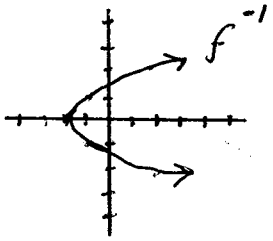
48. Write as a single natural logarithm: $2\ln 10 - \ln 5$

ANSWERS:
Chapter 7

1. $3|x^5|$
2. $x^4|y|$
3. -4
4. $\frac{3\sqrt{5}}{5}$
5. $5xy^3\sqrt[3]{x^2y^2}$
6. $4x^2\sqrt[3]{x}$
7. $6x^2y\sqrt{xy}$
8. $\frac{\sqrt[5]{xy}}{x}$
9. $29 + 3\sqrt{3}$
10. $\frac{12\sqrt{3}+8}{23}$
11. $10\sqrt{3}$
12. $\frac{1}{9}$
13. $x^{\frac{1}{2}}$
14. $x = 5$
15. $x = 17$
16. $x = 13$
17. $x = -\frac{7}{4}, \frac{5}{4}$
18. approx. 2.34 feet
19. a. $2x^2 + 3x + 2$ D = all reals
    b. $2x^2 - 3x + 4$ D = all reals
    c. $6x^3 - 2x^2 + 9x - 3$ D = all reals
    d. $\frac{2x^2+3}{3x-1}$ D = all reals except 1/3

20. $(fog)(x) = 18x^2 - 12x + 5$ $(gof)(x) = 6x^2 + 8$
21. $f[g(2)] = 53$ $g[f(2)] = 32$
22. $2x^2 + 2x + 24$
23. $(fog)(-3) = 45$ $(gof)(-3) = 6$
24. $f^{-1} = \frac{x+7}{4}$ Yes
25. $y = x^2 - 9$ Yes
26. $y = \pm\sqrt{x+2}$ No



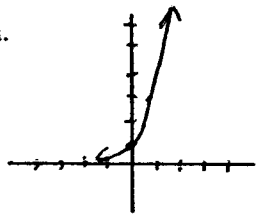


27. 10

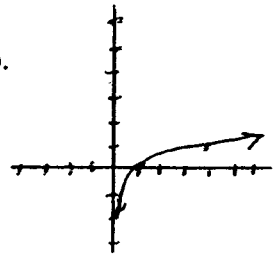
Chapter 8

28. a) decay b) growth
29. A line the graph approaches but does not cross.
30.

a.



b.



31. 12.1825
32. $A = 950e^{.065(10)} = \$1819.76$
33. 4.95%
34. $y = 100(.5)^{(1/30)(50)} = 31.498$ mg
35. a. $\log_{1/2}\frac{1}{16} = 4$

    b. $\log_2\frac{1}{32} = -5$
36. a. ½ b. 4 c. $\frac{4}{3}$
37. a. the first is the parent graph
    b. is moved left 2 and down 1
    c. moved right 3 and up 4
38. answers will vary
39. log 5 + log x - log 4 – log y
40. 2
41. 1
42. -2
43. 4.65
44. .67
45. 8
46. 134.476
47. .83
48. ln 20