Algebra 3-4 Final Exam Review

<u>Ch 6 questions</u>

Simplify each expression:

1. $\dfrac{36x^6y^{-10}}{16x^3y^{-8}}$

2. $\dfrac{(4x^{-2}y^{-3})(7x^4y^8)}{(x^3)^4y^2}$

3. $3x(5x^2-3x-1)-5x(7x-8)$

4. $(x^2-3x)(3x^2+4x-1)$

5. $\dfrac{12p^3t^2r-21p^2qtr^2-9p^3tr}{3p^2tr}$

6. $\dfrac{4x^3-2x^2+8x+8}{2x+1}$

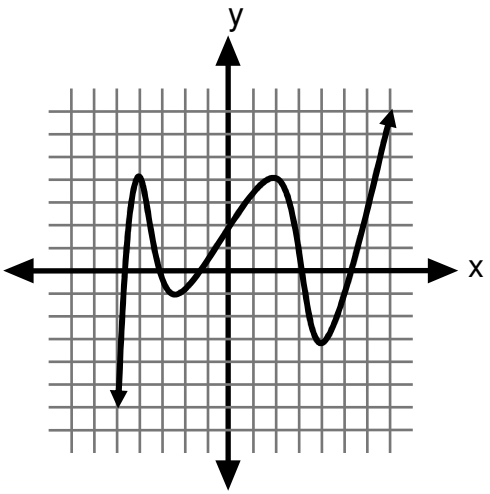
7. If $f(x)=-x^2+1,\ find\ f(-2)$

8. If $f(x)=2x^2-4x-1,\ find\ -2f(2a)$

9. Using the graph at the right, answer the

Following:

a) How many zeros?
b) Describe the end behavior
c) What are the x-coordinates of the extrema?



Solve the following equations by factoring.

10. $2x^3 - 5x^2 - 12x + 30 = 0$

11. $4x^3 + 32 = 0$

12. Find all the zeros of the polynomial function: $f(x) = x^3 - 7x^2 + 7x + 15$

13. Describe the zeros of the function: $f(x) = (x^2 + 4)(x^2 - 16)$

14. Write a polynomial with Zeros $-4 \text{ and } i$

Chapter 6 Answer Key:

1. $\frac{9x^3}{4y^2}$ 2. $\frac{28y^3}{x^{10}}$ 3. $15x^3 - 44x^2 + 37x$ 4. $3x^4 - 5x^3 - 13x^2 + 3x$

5. 4pt-7qr-3p 6. $2x^2 - 2x + 5 + \frac{3}{2x+1}$ 7. $f(-2) = -3$

8. $-2f(2a) = -16a^2 + 16a + 2$ 9. a) 5 b) As x $\to -\infty$ $f(x) \to -\infty$
As x $\to \infty$ $f(x) \to \infty$

10. $x = \pm 6, \frac{5}{2}$ 11. $x = \frac{2 \pm 2i\sqrt{3}}{2}, -2$ 12. X = -1, 3, 5

13. 2 real, 2 imaginary 14. $x^3 + 4x^2 + x + 4$

Ch 7 Questions

Simplify.

1. $\sqrt[4]{81x^6}$
2. $\sqrt[3]{27x^5}$
3. $\sqrt[4]{16y^7}$
4. $\sqrt[3]{-64a^{10}b^9}$
5. $\sqrt[3]{64y^8}$
6. $\sqrt{32x^5y^9z^8}$

Simplify.

7. $\left(5+\sqrt{12}\right)-\left(-3-\sqrt{75}\right)$
8. $\left(2+\sqrt{48}\right)+\left(4-\sqrt{27}\right)$
9. $\left(5+3\sqrt{8}\right)-\left(-2+\sqrt{50}\right)$
10. $\left(6-2\sqrt{45}\right)+\left(1-\sqrt{80}\right)$

Simplify.

11. $\left(5-3\sqrt{2}\right)\left(4+5\sqrt{2}\right)$
12. $\left(2-\sqrt{5}\right)\left(-2+3\sqrt{5}\right)$
13. $\left(3+4\sqrt{3}\right)\left(-2-2\sqrt{3}\right)$
14. $\left(1-2\sqrt{7}\right)\left(-3+4\sqrt{7}\right)$
15. $\dfrac{2+\sqrt{x}}{2+\sqrt{3}}$
16. $\dfrac{3}{4-\sqrt{2}}$

Solve.

17. $\sqrt{4x}-1=2$
18. $2\sqrt{3x+4}+1=15$
19. $\sqrt{3x-5}=x-1$
20. $\sqrt[3]{x-7}=\sqrt[3]{2x+4}$

Find each composite function.

21. $f(x) = 2x + 2$, $g(x) = 3x - 1$ Find $(f \circ g)(x)$
22. $f(x) = 2x - 2$, $g(x) = 2x + 1$ Find $(f \circ g)(x)$
23. $f(x) = 3x - 1$, $g(x) = 4x + 2$ Find $(g \circ f)(x)$
24. $f(x) = -3x^2 + 2$, $g(x) = 2x - 1$ find $(g \circ f)(x)$
25. $f(x) = 4x - 5$, $g(x) = 2x + 1$ find $(g \circ f)(x)$

Perform the indicated operations.

26. $f(x) = 2x + 2$, $g(x) = 3x - 1$ Find $f + g$
27. - $f(x) = 2x - 2$, $g(x) = 2x + 1$ Find $f - g$
28. $f(x) = 3x - 1$, $g(x) = 4x + 2$ Find $f - g$
29. $f(x) = -3x + 2$, $g(x) = 2x - 1$ find $f \cdot g$
30. $f(x) = 4x - 5$, $g(x) = 2x + 1$ find $f \cdot g$

Find the inverse of each function:

31. $f(x) = 4x + 2$
32. $f(x) = 2x - 3$
33. $f(x) = -5x + 2$
34. $f(x) = \frac{1}{3}x - 6$
35. $f(x) = 3x - 6$

Find the inverse:

36. $\{(1,5), (-2,3), (6,7), (-1,3)\}$
37. $\{(5,3), (2,3), (-6,3), (8,3)\}$

Ch 7 Answer Key

1. $3x\sqrt[4]{x^2}$
2. $3x\sqrt[3]{x^2}$
3. $2y\sqrt[4]{y^3}$
4. $-4a^3b^3\sqrt[3]{a}$
5. $4y^2\sqrt[3]{y^2}$
6. $4x^2y^4z^4\sqrt{2xy}$
7. $8+7\sqrt{3}$
8. $6+\sqrt{3}$
9. $7+\sqrt{2}$
10. $7-10\sqrt{5}$
11. $-10+13\sqrt{2}$
12. $-19+8\sqrt{5}$
13. $-30-14\sqrt{3}$
14. $-59+10\sqrt{7}$
15. $4-2\sqrt{3}+2\sqrt{x}-\sqrt{3x}$
16. $\frac{4+\sqrt{2}}{4}$
17. $x=\frac{9}{4}$
18. x = 15
19. x = 2, 3
20. x = -11
21. 6x
22. 4x
23. 12x-2
24. $-6x^2+3$
25. 8x-9
26. 5x+1
27. -3
28. -x-3

29. $-6x^2+7x-2$

30. $8x^2-6x-5$

31. $f^{-1}(x)=\frac{x}{4}-\frac{1}{2}$

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

33. $f^{-1}(x)=-\frac{x}{5}+\frac{2}{5}$

34. $f^{-1}(x)=3x+18$

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

36. { (5,1), (3,-2), (7,6), (3,-1) }

37. { (3,5), (3,2), (3,-6), (3,8) }

Ch 8 questions

Write each logarithmic equation in exponential form and each exponential equation in logarithmic form

1. $2^3 = 8$
2. $\frac{1}{2}^3 = \frac{1}{8}$
3. $m^n = p$
4. $\log_3 81 = 4$
5. $\log_x y = z$

Condense each expression as a single logarithm.

6. $\log_4 8 + \log_4 8$
7. $\log_3 15 + \log_3 x$
8. $\log_z 15 + 2\log_z x - \log_z y$
9. $\log_m 12 - \log_m (3x)$
10. $2\log_b x - \log_b 2y$

Describe the transformations in the graph of the functions. State the domain and range. Graph the functions.

11. $f(x) = -(2)^{x+2}$
12. $y = \left(\frac{1}{2}\right)^{x-3} + 1$
13. $y = \log_2(x-1) + 2$
14. $f(x) = \log_3(x+3) - 1$
15. $f(x) = -\log_2(x+2)$

Use a calculator to evaluate each expression. Round to 2 decimal places.

16. $\log 102$
17. $\log(-3)$
18. $\ln 12$
19. $\log_3 12$

Solve. Check for extraneous solutions when necessary.

20. $10^x = 0.007$
21. $\log x = 5$
22. $\log 7 - \log x = \log 28$
23. $3^{x-4} = 9^{x+28}$
24. $\log_3(a-3) + \log_3 a = \log_3 4$
25. $2\log_3 x = \log_3(2x+3)$
26. $4 = \log_5 z$
27. $\log_2 x + \log_2(x+2) = 3$
28. $e^{2x} = 9$
29. $\log_8(x-3) + \log_8(x+4) = 1$

$$A = P\left(1 + \frac{r}{n}\right)^{nt}$$

30. Find the balance of an account after 7 years if $600.00 is deposited into an account paying 3.6% interest compounded quarterly.

31. Find the balance of an account after 14 years if $10,000 is deposited into an account paying 4.5% interest compounded monthly.

32. Find the balance of an account after 12 years if $6000 is deposited into an account paying 2.4% interest compounded weekly.

33. The population of rabbits in an area is modeled by the growth equation: $A = 8e^{0.26t}$ where A is in thousands and t is in years. How long will it take for the population to double?

Chapter 8 Answer Key:

1. $\log_2 8 = 3$
2. $\log_{\frac{1}{2}} \frac{1}{8} = 3$
3. $\log_m p = n$
4. $3^4 = 81$
5. $x^z = y$
6. $\log_4 64$
7. $\log_3 15x$
8. $\log_z \frac{15x^2}{y}$
9. $\log_m \frac{4}{x}$
10. $\log_b \frac{x^2}{2y}$
11. Left 2, reflected over x-axis. Domain: All real numbers; Range: $y < 0$
12. Right 3. Domain: All real numbers; Range: $y > 0$
13. Right 1, up 2. Domain: $x > 1$; Range: All real numbers.
14. Left 3, down 1. Domain: $x > -3$ $x > 1$; Range: All real numbers.
15. Left 2, reflect over x-axis. Domain: $x > -2$; Range: All real numbers.
16. ≈ 2.01
17. non-real answer
18. ≈ 2.48
19. ≈ 2.26
20. $x \approx -2.15$
21. $x = 100{,}000$
22. $x = \frac{1}{4}$
23. $x = -60$
24. $a = 4$ ($a = -1$ *is extraneous*)
25. $x = 3$ ($x = -1$ *is extraneous*)
26. $z = 625$
27. $x = 2$ ($x = -4$ *is extraneous*)
28. $x \approx 1.10$
29. $x = 4$ ($x = -5$ *is extraneous*)
30. \$7710.88
31. \$18,753.99
32. \$8002.01
33. 7.48 years

Ch 9 questions

Simplify:

1) $\dfrac{x^2+10x+25}{x^2-9}\cdot\dfrac{5x+15}{x^2-25}$

A) $\dfrac{5(x+5)}{(x-3)(x-5)}$ B) $\dfrac{15x+5}{(x-3)(x-5)}$ C) $\dfrac{15x+5}{(x-3)(x-5)}$ D) $\dfrac{5(x-5)}{(x+3)(x+5)}$

2) Simplify:

$\dfrac{x^2+2x-8}{x^2-16}\cdot\dfrac{x^2-8x+16}{x^2-6x+8}$

A) $\dfrac{x-2}{x+4}$ B) $\dfrac{x-4}{x+4}$ C) $\dfrac{x-2}{x+4}\cdot$ D) 1

3) Simplify:

$$\frac{\dfrac{x^2-9}{6x-12}}{\dfrac{x^2+10x+21}{x^2-x-2}}$$

A) $\dfrac{(x+3)(x+1)}{6(x-7)}$ B) $\dfrac{(x-3)(x+1)}{6(x+7)}$ C) $\dfrac{(x+3)(x+1)}{6(x-2)}$ D) $\dfrac{(x-3)(x+1)}{6(x-2)}$

4) Simplify:

$\dfrac{6x+12}{2x-10}\div\dfrac{x^2-4x-12}{x^2-5x}$

A) $\dfrac{3x}{x+6}$ B) $\dfrac{3x}{x-6}$ C) $\dfrac{6(x+2)(x-6)(x+2)}{2x(x-5)(x-5)}$ D) $\dfrac{6(x-6)(x+2)^2}{2x(x-5)^2}$

5) Simplify:

$\dfrac{15a^2b^2}{21ac}\cdot\dfrac{14a^4c^2}{6ab^3}$

A) $\dfrac{7a^3}{3b}$ B) $\dfrac{7a^4}{3b}$ C) $\dfrac{5a^3}{3b}$ D) $\dfrac{5a^4}{3b}$

For 6-8, Identify all the domain and range; vertical and horizontal asymptotes; holes; and x- and y-intercepts.

6) $f(x) = \dfrac{x^2 - 4}{x^2 - 3x + 2}$

7) $f(x) = \dfrac{x - 2}{x^2 + x - 6}$

8) $f(x) = \dfrac{x^3}{(x+4)(x-1)}$

9) Add: $\dfrac{3x - 10}{x^2 + 4x - 12} + \dfrac{2}{x + 6}$

A) $\dfrac{5x - 14}{(x+6)}$ B) $\dfrac{5x - 14}{(x-2)}$ C) $\dfrac{5x - 14}{(x+6)(x-2)}$ D) $\dfrac{5x + 14}{(x+6)(x-2)}$

10) Subtract: $\dfrac{5x}{x-3} - \dfrac{2x}{2x+1}$

A) $\dfrac{10x^2 - 3x - 6}{(x-3)}$ B) $\dfrac{10x^2 + 3x + 6}{(x-3)}$ C) $\dfrac{10x^2 + 3x + 6}{(x-3)(2x+1)}$ D) $\dfrac{10x^2 - 3x + -6}{(x-3)(2x+1)}$

11) Solve: $\dfrac{x+2}{x-2} = \dfrac{x-3}{x-1}$

A) x = 4/3 B) x = -4/3 C) x = 3/4 D) no solution

12) Solve:

$$\frac{4}{x^2 - 8x + 12} = \frac{x}{x-2} + \frac{1}{x-6}$$

A) x = -1 B) x = 6 C) x = -1 and x = 6 D) No solution

Chapter 9 Answer Key:

1) **A**
2) **D**
3) **B**
4) **B**
5) **D**

6) Domain: $x \neq 2$ *or* 1 Range: $y \neq 1$ Hole: none
   VA: $x = 2$ *and* $x = 1$ HA: $y = 1$
   x-int: $(0, 0)$ *and* $(0, 4)$ y-int: $(0, -2)$
7) Domain: $x \neq 2$ *or* -3 Range: $y \neq 0$ VA: $x = -3$
   HA: $y = 0$ Hole: $\left(2, \frac{1}{5}\right)$ x-int: none y-int: $\left(0, \frac{1}{3}\right)$
8) Domain: $x \neq -4$ *or* 1 Range: all real numbers
   VA: $x = -4$ *and* $x = 1$ HA: none Hole: none
   x-int: $(0, 0)$ y-int: $(0, 0)$
9) **C**
10) **C**
11) **A**
12) **A**

Ch 11 Questions

1. Find the indicated term of the arithmetic equation.
   $A_1 = 9$, d = 3, n = 14

2. Find the arithmetic means in each sequence.
   -12, _, _, _, 8

3. Find S_n for the arithmetic series.
   $A_1 = 16$, $a_n = 48$, n = 6

4. $\sum_{k=5}^{21} 3k - 2$

5. Find the indicated term for the geometric sequence.
   $A_1 = 5$, r = 2, n =7

6. Find the geometric means in each sequence.
   6, _, _, 162

7. Find S_n for each geometric series.
   $A_1 = 15$, r = 2, n = 4

8. Evaluate the sum of each geometric series.

$$\sum_{k=1}^{7} 3k$$

9. Recursive: Find the first five terms of the sequence.
   $A_1 = -3$, $a_{n=1} = a_n + 4$

10. Expand the binomial. $(a + b)^3$

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Chapter 11 Answer Key:

1. 48
2. -7, -2, 3
3. 192
4. 629
5. 320
6. 18,54
7. 225
8. 84
9. -3,1,5,9,13
10. $A^3 + 3a^2b + 3ab^2 + b$