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Rational Functions (Ch. 6):• Using LCDs:

- When you **add or subtract** rational expressions, use the LCD to find a common denominator.
- When **simplifying complex fractions**, multiply the top and bottom by the LCD to get rid of all “embedded” fractions.
- When **solving rational equations**, multiply the left and right sides by the LCD to get rid of all fractions.

1. Find the **domain** of the function $f(x) = \frac{7x + 1}{x^2 - x - 2}$

2. Simplify the expression completely: $\frac{x^2 + 6x + 8}{2x^2 - 32}$

(Hint: First factor the numerator and denominator.)

3. Simplify the expression completely: $\frac{\frac{2}{x+2}}{\frac{1}{x+2} - \frac{2}{x}}$

(Hint: Multiply top and bottom the the common denominator of all “embedded” fractions.)

4. Simplify by dividing: $\frac{4x^4y^3 + 4x^3y^4 + 10xy^5}{2xy^3}$

5. Multiply $\frac{2x^2 - 4x}{x^2 - 1} \cdot \frac{x^2 - 2x - 3}{x^2 - 5x + 6}$

(Hint: First factor and cancel, then multiply.)

6. Divide $\frac{x^2 - 16}{2x^2 + 7x + 3} \div \frac{2x^2 - 5x - 12}{4x^2 + 8x + 3}$

7. Subtract by first finding a common denominator: $\frac{x - 7}{x^2 + x - 12} - \frac{5x}{x^2 + 9x + 20}$

8. Solve for x : $\frac{x + 4}{x^2 + 5x} = \frac{-2}{x^2 - 25}$

Don't forget to check for extraneous solutions!

Exponents and Scientific notation (1.6, 1.7):

9. Multiply and simplify: $(-4x^{-5}y)(-2x^3y^{-4})^{-2}$
10. Simplify $\left(\frac{x^{-1}y^2}{x^5y^7}\right)^{-3}$
11. Write 1.03×10^4 in decimal notation.
12. Write 0.00006007 in scientific notation.
13. Divide $\frac{1.1 \times 10^4}{4.4 \times 10^2}$. Answer in scientific notation.

Radicals and rational exponents (Ch. 7):

14. Find the **domain** of $f(x) = \sqrt{1-x}$
15. Simplify completely: $(x^{-1/3}y^{3/4})^{-1/2}$
16. Simplify completely: $\sqrt[3]{81x^6y^4}$
17. Add $3\sqrt{12x} + 3\sqrt{27x}$
18. Multiply and simplify: $(2\sqrt{2x^3})(-4\sqrt{8xy^7})$
19. Divide and simplify: $\frac{\sqrt[3]{80x^5}}{\sqrt[3]{2x}}$
20. Simplify: $\sqrt{x} \sqrt[5]{x}$
21. Rationalize the denominator: $\frac{x^2}{\sqrt{7y}}$
22. Rationalize the denominator: $\frac{1 - \sqrt{7}}{\sqrt{5} + \sqrt{3}}$
23. Solve for x : $\sqrt{6x+7} - 2 = x$
24. Solve for x : $\sqrt{x+5} - 2 = \sqrt{x-3}$

Don't forget to check for extraneous solutions!

Inverses, Exponential Functions and Logarithms (Ch. 9):

25. Given $f(x) = 2x - 1$ and $g(x) = x^2 + 1$, find $(f \circ g)(x)$ and $(g \circ f)(x)$.
26. Given $f(x) = \frac{2x + 7}{3}$, find $f^{-1}(x)$.
27. According to the the U.S. Bureau of the Census, in 1990 there were 22.4 million residents of Hispanic origin living in the U.S. By 2005, the number had grown to 41.9 million.
- (a) Find an **exponential growth model** $f(t) = A_0e^{kt}$ that describes the U.S. Hispanic population in millions, where t represents the number of years after 1990. Round k to 2 decimal places.
- (b) According to your model, in what year will the U.S. Hispanic population reach 80 million?
28. The **half-life** of Polonium-210 is 140 days. Find the value of k in the **exponential decay** model $f(t) = A_0e^{kt}$ for Polonium-210. Round your answer to 3 decimal places.
29. Rewrite $7 = \log_3(x)$ as an exponent.
30. Rewrite $2^x = 30$ as a logarithm.
31. Expand $\log\left(\frac{\sqrt[4]{x}}{5y^2}\right)$ as much as possible.
32. Combine $2\ln(x) - \frac{2}{3}\ln(x - 5) - \ln(2 - x)$ into a single logarithm
33. Find the **domain** of the function $f(x) = \log_3(3x - 4)$.
34. Solve for x and round your answer to 2 decimal places: $4^{x+1} = 16$
35. Solve for x : $7 \cdot 5^{2x} = 134$
36. Solve for x : $\log(x) + \log(x - 3) = 1$
Don't forget to check for extraneous solutions!
37. Solve for x : $\ln(x + 2) - \ln(4x + 3) = \ln\left(\frac{1}{x}\right)$
Don't forget to check for extraneous solutions!

Compound Inequalities and Absolute Values (4.2, 4.3):

38. Solve and graph on a number line: $3x - 5 \leq -2$ or $10 - 2x < 4$
39. Solve for x : $2|1 - 3x| - 28 = 0$
40. Solve and graph on a number line: $2|2x + 3| > 10$

Distances and Circles (10.1):

41. Find the distance between $P = (1, 3)$ and $Q = (2, -3)$.
42. Write an equation for the circle with center $(1, -2)$ and radius 4.
43. Graph the circle $(x - 2)^2 + (x + 2)^2 = 1$ by first finding the center and the radius.

Sequences and Series (Ch. 11):

44. Use the formula $a_n = a_1 + d(n - 1)$ to find a formula for the **arithmetic sequence** $-70, -75, -80, -85, \dots$, then find a_{10} .
(Hint: First find the common difference d .)
45. Use the formulas $a_n = a_1 + d(n - 1)$ and $S_n = \frac{n}{2}(a_1 + a_n)$ to find the sum of the first 20 terms of the **arithmetic sequence** $-15, -9, -3, 3, 9, \dots$.
(Hint: First find d and a_{20} .)
46. Use the formula $a_n = a_1 \cdot r^{n-1}$ to find a formula for the **geometric sequence** $3, 12, 48, 192, \dots$.
(Hint: First find the common ratio r .)
47. Use the formula $S_n = \frac{a_1(1 - r^n)}{1 - r}$ to find the sum of the first 8 terms of the **geometric sequence** $2, 6, 18, 54, \dots$.