

# Rational Expression Review

In Exercises 1–8, find the domain of the expression.

$$\begin{aligned} 1. \quad & 3x^2 - 4x + 7 \\ 2. \quad & \frac{2x^2 + 5x - 2}{x - 1}, \quad x > 0 \\ 3. \quad & \frac{4x^3 + 3}{x^2 - 9}, \quad x \geq 0 \\ 4. \quad & \frac{x+1}{2x+1} \\ 5. \quad & \frac{1}{x-2} \\ 6. \quad & \frac{\sqrt{6-x}}{x+1} \\ 7. \quad & \sqrt{\frac{x-2}{x+1}} \\ 8. \quad & \frac{t^2 - t - 6}{t^2 + 6t + 9} \cdot \frac{t+3}{t^2 - 4} \end{aligned}$$

In Exercises 35–42, perform the multiplication or division and simplify.

$$\begin{aligned} 35. \quad & \frac{5}{x-1} \cdot \frac{x-1}{25(x-2)} \\ 36. \quad & \frac{x+13}{x^3(3-x)} \cdot \frac{x(x-3)}{5} \\ 37. \quad & \frac{r}{r-1} \cdot \frac{r^2-1}{r^2} \\ 38. \quad & \frac{4y-16}{5y+15} \cdot \frac{2y+6}{4-y} \\ 39. \quad & \frac{t^2-t-6}{t^2+6t+9} \cdot \frac{t+3}{t^2-4} \end{aligned}$$

In Exercises 11–28, write the rational expression in simplest form.

\begin{aligned} 11. \quad & \frac{15x^2}{10x} \\ 12. \quad & \frac{18y^2}{60y^5} \\ 13. \quad & \frac{3xy}{xy+x} \\ 14. \quad & \frac{2x^2y}{xy-y} \\ 15. \quad & \frac{4y-8y^2}{10y-5} \\ 16. \quad & \frac{9x^2+9x}{2x+2} \\ 17. \quad & \frac{x-5}{10-2x} \\ 18. \quad & \frac{12-4x}{x-3} \\ 19. \quad & \frac{y^2-16}{y+4} \\ 20. \quad & \frac{x^2-25}{5-x} \\ 21. \quad & \frac{x^3+5x^2+6x}{x^2-4} \\ 22. \quad & \frac{x^2+8x-20}{x^2+11x+10} \\ 23. \quad & \frac{y^2-7y+12}{y^2+3y-18} \\ 24. \quad & \frac{x^2-7x+6}{x^2+11x+10} \\ 25. \quad & \frac{2-x+2x^2-x^3}{x^2-4} \\ 26. \quad & \frac{x^2-9}{x^3+x^2-9x-9} \\ 27. \quad & \frac{y^3-2y^2-3y}{y^3+1} \\ 28. \quad & \frac{z^3-8}{z^2+2z+4} \end{aligned}

In Exercises 43–52, perform the addition or subtraction and simplify.

\begin{aligned} 43. \quad & \frac{5}{x-1} + \frac{x}{x-1} \\ 44. \quad & \frac{2x-1}{x+3} + \frac{1-x}{x+3} \\ 45. \quad & 6 - \frac{5}{x+3} \\ 46. \quad & \frac{3}{x-1} - 5 \\ 47. \quad & \frac{3}{x-2} + \frac{5}{2-x} \\ 48. \quad & \frac{2x}{x-5} - \frac{5}{5-x} \\ 49. \quad & \frac{1}{x^2-x-2} - \frac{x}{x^2-5x+6} \\ 50. \quad & \frac{2}{x^2-x-2} + \frac{10}{x^2+2x-8} \\ 51. \quad & \frac{-1}{x} + \frac{2}{x^2+1} + \frac{1}{x^3+x} \\ 52. \quad & \frac{2}{x+1} + \frac{2}{x-1} + \frac{1}{x^2-1} \end{aligned}

In Exercises 63–70, simplify the compound fraction.

$$\begin{aligned} 63. \quad & \frac{\frac{x}{y^2}-\frac{y}{x^2}}{\frac{1}{y^2}-\frac{1}{x^2}} \\ 64. \quad & \frac{\frac{1}{x}-\frac{1}{y}}{\frac{1}{x^2}-\frac{1}{y^2}} \\ 65. \quad & \frac{2x+\frac{13x-3}{x-4}}{\frac{x+3}{x-4}} \\ 66. \quad & \frac{2-\frac{13}{x+5}}{2+\frac{3}{x-3}} \\ 67. \quad & \frac{\frac{1}{x+h}-\frac{1}{x}}{2x+\frac{x+3}{x-4}} \\ 68. \quad & \frac{\frac{x+h}{x+h+2}-\frac{x}{x+2}}{2+\frac{3}{x-3}} \\ 69. \quad & \frac{\frac{b}{a}-\frac{a}{b}}{\frac{1}{a}-\frac{1}{b}} \\ 70. \quad & \frac{\frac{1}{b}-\frac{1}{a}}{\frac{a}{b}-\frac{a}{b}} \end{aligned}$$