Simplify the rational expression, if possible.

9. $\frac{x^2-x-20}{x^2+2x-15} = \frac{(x-5)(x+4)}{(x+5)(x-3)}$

10. $\frac{x^2+6x}{x^2+8x+12} = \frac{x(x+6)}{(x+6)(x+2)} = \frac{x}{x+2}$

Perform the indicated operation and simplify.

11. $\frac{80x^4}{y^3} \cdot \frac{xy}{5x^2} = \frac{16x^3}{y^2}$

12. $\frac{3x^2y}{4x^3y^5} \div \frac{6y^2}{2xy^3} = \frac{3x^2y}{4x^3y^5} \cdot \frac{2xy^3}{6y^2} = \frac{1}{4y^3}$

Find the least common multiple.

13. $x^4 - 4x^2$ and $x^2 - 2x - 8$

$x^2(x^2-4)$ $(x-4)(x+2)$

LCD: $x^2(x-4)(x+2)(x-2)$

14. $2x - 6$ and $x^3 + 10x^2 + 21x$

$2(x+3)$ $x(x^2+10x+21) = x(x+3)(x+7)$

LCD: $2x(x+3)(x+7)$

Perform the indicated operation and simplify.

15. $\frac{2}{3x} + \frac{7}{4x}$ LCD: $12x$

$= \frac{2(4)+7(3)}{12x}$

$= \frac{29}{12x}$

16. $\frac{x}{x^2-4} - \frac{3x-5}{x^2+4x+4}$

LCD: $(x+2)^2(x-2)$

$= \frac{x(x+2)-(3x-5)(x-2)}{(x+2)^2(x-2)}$

$= \frac{-2x^2+13x-10}{(x+2)^2(x-2)}$

Solve the equation.

17. $\frac{3x-3}{x+6} = \frac{3x-3}{2x-1}$

$6x^2-9x+3 = 3x^2+15x-18$

$3x^2-24x+21=0$

$3(x^2-8x+7)=0$ $x=7, 1$

$3(x-7)(x-1)=0$

18. $\frac{x+3}{2-2x} = \frac{x^2+x}{1-x}$ LCD: $2(1-x)$

$x+3 = 2(x^2+x)$

$x+3 = 2x^2+2x$

$0 = 2x^2+x-3$

$3 \cdot -2 = -6$, $1 + -3 = -2$

$x = -3/2, 1$

19. $\frac{2x+14}{x+4} - 2 = \frac{2x+20}{2x+8}$ LCD: $2(x+4)$

$2(2x+14) - 2(2(x+4)) = 2x+20$

$4x+28-4x-16 = 2x+20$

$-8 = 2x$

$x = -4$ no solution

20. $\frac{3x}{x+1} = \frac{12}{x^2-1} + 2$ LCD: $(x+1)(x-1)$

$3x(x-1) = 12 + 2x^2 - 2$

$3x^2-3x = 12+2x^2-2$

$x^2-3x-10=0$

$(x-5)(x+2)=0$

$x=5, -2$