

What is the Domain (what can  $x$  be) for each of the following functions? Show all your work.

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

2.  $f(x) = \frac{x^2-9}{4x^2-25}$

3.  $f(x) = \frac{4x}{3x^2-4x}$

Perform the indicated operation and simplify the result. Circle your answers. Show all your work.

4.  $\frac{4xy^2(x+5)}{12x^2y(x+5)}$

5.  $\frac{x^2-y^2}{3x^2-3xy}$

6.  $\frac{9-x^2}{6x+18}$

7.  $\frac{x^2-5x-14}{x^2+x-2}$

8.  $\frac{x^2-3x-10}{x^2-5x}$

9.  $\frac{3x^2-13x+4}{x^2-3x-4}$

$$10. \frac{x-3}{x^2+2x-15} \cdot \frac{x^2-25}{x^2+3x-40}$$

$$11. \frac{x^2-3x-4}{x^2-2x} \cdot \frac{x^2-4}{x^2+3x+2}$$

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

$$13. \frac{x^2-x-6}{x^2+3x+2} \div \frac{5x-15}{x^2+2x}$$

$$14. \frac{3x-2}{2x^2-2x} + \frac{4}{x-1}$$

$$15. \frac{x+1}{3x-6} - \frac{x-3}{4x-8}$$

$$16. \quad \frac{x+1}{x^2-6x+8} - \frac{3}{2x-4}$$

$$17. \quad \frac{3}{x^2-5x} + \frac{5}{x^2-x-20}$$

$$18. \quad \frac{1}{x^2+3x+2} + \frac{2}{x^2-4}$$

$$19. \quad \frac{5}{x-3} + \frac{2}{x} + \frac{5}{x^2-3x}$$

$$20. \quad \frac{\frac{x-2}{x-3} + 4}{\frac{3}{x-3} - 2}$$

$$21. \quad \frac{\frac{3}{x-5} - \frac{1}{x+5}}{\frac{x-4}{x^2-25}}$$

**Solve for x.**

$$22. \quad \frac{x}{3} - \frac{x+3}{2} = \frac{x-3}{4}$$

$$23. \quad \frac{x-1}{3x+6} = \frac{x-1}{x+2} - \frac{2}{3}$$

$$24. \quad \frac{2x+3}{x^2-x-12} = \frac{3}{2x+6}$$

$$25. \quad \frac{1}{x-3} - \frac{x-11}{x^2-9} = \frac{2}{x+3}$$

**Answers:**

1. ARN except  $\frac{2}{5}$

2. ARN except  $\frac{5}{2}$  or  $\frac{-5}{2}$

3. ARN except 0 or  $\frac{4}{3}$

4.  $\frac{y}{3x}$

5.  $\frac{x+y}{3x}$

6.  $\frac{-(x-3)}{6}$

7.  $\frac{x-7}{x-1}$

8.  $\frac{x+2}{x}$

9.  $\frac{3x-1}{x+1}$

10.  $\frac{3x-1}{x+1}$

11.  $\frac{x-4}{x}$

12.  $\frac{1}{2}$

13.  $\frac{x(x+2)}{5(x+1)}$

14.  $\frac{5x-2}{2x(x-1)}$

15.  $\frac{x+13}{12(x-2)}$

16.  $\frac{-x+14}{2(x-2)(x-4)}$

17.  $\frac{4(2x-3)}{x(x-5)(x-4)}$

18.  $\frac{3x}{(x+1)(x+2)(x-2)}$

19.  $\frac{7x-1}{x(x-3)}$

20.  $\frac{(x+1)}{x(x-1)}$

21.  $\frac{2(x+10)}{x-4}$

22.  $x = \frac{-9}{5}$

23.  $x = -5$

24.  $x = -18$

25.  $x = 10$