

1)  $\frac{x^2+x}{x}, x \neq 0$  (A)

2)  $3x-9 \neq 0$   
 $3x \neq 9$   
 $x \neq 3$

3)  $x^2-4 \neq 0$   
 $(x+2)(x-2) \neq 0$   
 $x \neq -2, x \neq 2$

4) a)  $\frac{5}{3x} \cdot \frac{6x}{x+2}$   
 $= \frac{10}{x(x+2)}, x \neq 0, -2$

b)  $\frac{x}{x+2} \cdot \frac{x-2}{x-3}$   
 $= \frac{x(x-2)}{(x+2)(x-3)}, x \neq -2, 3$

c)  $\frac{x+3}{5x-1} \div \frac{2x+6}{4x}$   
 $= \frac{x+3}{5x-1} \cdot \frac{2x}{2(x+3)}$   
 $= \frac{x}{5x-1}, x \neq 0, \frac{1}{5}, -3$

d)  $\frac{x^2+3x}{x^2-4} \div \frac{x+3}{x+2}$   
 $= \frac{x(x+3)}{(x+2)(x-2)} \cdot \frac{x+2}{x+3}$   
 $= \frac{x}{x-2}, x \neq \pm 2, -3$

5) a)  $\frac{3}{5x} + \frac{7x}{4}$   
 $= \frac{3(4) + 7x(5x)}{20x}$   
 $= \frac{12+35x^2}{20x}, x \neq 0$

b)  $\frac{4x}{x+2} - \frac{5x-3}{x+2}$   
 $= \frac{4x-5x+3}{x+2}$   
 $= \frac{-x+3}{x+2}, x \neq -2$

c)  $\frac{x}{x-3} - \frac{3}{x-3}$   
 $= \frac{x-3}{x-3}$   
 $= 1, x \neq 3$

d)  $\frac{x}{x^2-4} + \frac{3x}{x^2+2x}$   
 $= \frac{x}{(x+2)(x-2)} + \frac{3x}{x(x+2)}$   
 $= \frac{x(x) + 3x(x-2)}{x(x+2)(x-2)}$   
 $= \frac{x^2+3x^2-6x}{x(x+2)(x-2)}$   
 $= \frac{4x^2-6x}{x(x+2)(x-2)} = \frac{2x(2x-3)}{x(x+2)(x-2)} = \frac{2(2x-3)}{(x+2)(x-2)}, x \neq \pm 2, 0$

$$e) \frac{x^2+3x}{x^2-4} + \frac{x^2+5x}{x+2}$$

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

$$= \frac{x^2+3x+x^3-2x^2+5x^2-10x}{(x+2)(x-2)}$$

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

$$= \frac{x(x^2+4x-7)}{(x+2)(x-2)} \quad , x \neq \pm 2$$

$$b) a) \frac{5x-1}{4x+11} = \frac{3}{4}$$

$$4(4x+11) \left( \frac{5x-1}{4x+11} \right) = 4(4x+11) \left( \frac{3}{4} \right)$$

$$4(5x-1) = 3(4x+11)$$

$$20x-4 = 12x+33$$

$$20x-12x = 33+4$$

$$8x = 37$$

$$x = \frac{37}{8}$$

$$b) \frac{3}{x} + \frac{5}{3} = 10$$

$$3x \left( \frac{3}{x} \right) + 3x \left( \frac{5}{3} \right) = 3x(10)$$

$$9 + 5x = 30x$$

$$9 = 30x - 5x$$

$$\frac{9}{25} = \frac{25x}{25}$$

$$x = \frac{9}{25}$$

$$c) \frac{4}{x} + \frac{6x}{x+1} = 6$$

$$x(x+1) \left( \frac{4}{x} \right) + x(x+1) \left( \frac{6x}{x+1} \right) = x(x+1)(6)$$

$$4(x+1) + 6x(x) = (x^2+x)(6)$$

$$4x+4 + 6x^2 = 6x^2 + 6x$$

$$4x-6x = -4$$

$$-2x = -4$$

$$x = 2$$

$$d) \frac{2x}{x+3} + \frac{x}{x-3} = \frac{18}{x^2-9}$$

$$x \neq \pm 3$$

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

$$(x+3)(x-3) \left( \frac{2x}{x+3} \right) + (x+3)(x-3) \left( \frac{x}{x-3} \right) = \cancel{(x+3)(x-3)} \left( \frac{18}{\cancel{(x+3)(x-3)}} \right)$$

$$2x(x-3) + x(x+3) = 18$$

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

$$3x^2 - 3x - 18 = 0$$

$$3(x^2 - x - 6) = 0$$

$$x^2 - x - 6 = 0 \quad \begin{array}{l} p \quad -6 \\ \sum \quad -1 \end{array}$$

$$(x-3)(x+2) = 0 \quad -3, 2$$

$$\boxed{x=3} \quad \boxed{x=-2}$$

extraneous  
root

solution.