

$$(40.) \text{ a) } \left(\frac{2x^3}{3}\right)(-6x) = -4x^4; \text{ b) } \left(\frac{2x^2}{9}\right)\left(-\frac{3}{5}x^3\right) = -\frac{2}{15}x^5; \text{ c) } (7xy^2) \cdot 2y = 14xy^3$$

$$(41.) \text{ a) } \frac{5x^4y}{3xy^2} = \frac{5x^3}{3y}; \text{ b) } \frac{5x^4y^2}{3x^3y} = \frac{5x^1y^1}{3}; \text{ c) } \frac{\sqrt{3x^2}}{5x^4} = \frac{\sqrt{3}}{5x^2} \quad \left\{ \text{ d) } 5xy^2(-3xz) = -15xy^2z \right.$$

$$(42.) \text{ a) } P \cdot Q = (4x^2+3)(5x^2-3x+7) = 20x^4 - 12x^3 + 28x^2 + 15x^2 - 9x + 21 = 20x^4 - 12x^3 + 43x^2 - 9x + 21$$

$$\text{ b) } P \cdot R = (4x^2+3)(5x-8) = 20x^3 - 32x^2 + 15x - 24$$

$$\text{ c) } Q \cdot R = (5x^2-3x+7)(5x-8) = 25x^3 - 40x^2 - 15x^2 + 24x + 35x - 56 = 25x^3 - 55x^2 + 59x - 56$$

$$(43.) \text{ a) } \text{Grado } 6; \text{ b) } \text{Grado } 4; \text{ c) } \text{Grado } 2$$

$$(44.) P+Q = x^4 + 5x^3 - 2x^2 - 1; \quad P-Q = -x^4 + 5x^3 + 2x^2 - 4x + 3$$

$$(45.) \text{ a) } (x+1)(x-1) = x^2 - 1; \text{ b) } (2x+3)(2x-3) = 4x^2 - 9; \text{ c) } \left(\frac{x-1}{3}\right)\left(\frac{x+1}{2}\right) = \frac{x^2-1}{6}$$

$$(46.) \text{ a) } 2x(x^2+3x-1) = 2x^3 + 6x^2 - 2x \quad \left\{ \text{ d) } (ax+b)(ax-b) = a^2x^2 - b^2 \right.$$

$$\text{ b) } 2x^2(3x^2-4x+6) = 6x^4 - 8x^3 + 12x^2; \text{ c) } -2(-3x^3-x) = 6x^3 + 2x;$$

$$\text{ d) } 5(x^2+x-1) = 5x^2 + 5x - 5; \text{ e) } -7x^5(2x^2-3x-1) = -14x^7 + 21x^6 + 7x^5;$$

$$\text{ f) } -7x(2x^3-3x^2+x) = -14x^4 + 21x^3 - 7x^2; \text{ g) } 4x^2(3-5x+x^3) = 12x^2 - 20x^3 + 4x^5;$$

$$\text{ h) } 8x^2(x^2+3) = 8x^4 + 24x^2; \text{ i) } -x^3(-3x+2x^2) = 3x^4 - 2x^5; \text{ j) } -4x(x+(3x^3)-2) = -4x^2 - 36x^3 + 8x$$

$$(47.) \text{ a) } (x+4)^2 = x^2 + 8x + 16; \text{ b) } (2x-5)^2 = 4x^2 - 20x + 25; \text{ c) } (1-6x)^2 = 1 - 12x + 36x^2;$$

$$\text{ d) } \left(\frac{x}{2} + \frac{3}{4}\right)^2 = \frac{x^2}{4} + \frac{3}{4}x + \frac{9}{16}; \text{ e) } (2x^2 - \frac{1}{2})^2 = 4x^4 - 2x^2 + \frac{1}{4}; \text{ f) } (ax+b)^2 = a^2x^2 + 2axb + b^2$$

$$(48.) \text{ a) } x(5x^2+3x-1) - 2x^2(x-2) + 12x^2 = 5x^3 + 3x^2 - x - 2x^3 + 4x^2 + 12x^2 = 3x^3 + 14x^2 - x$$

$$\text{ b) } 5(x-3) + 2(y+4) - \frac{7}{3}(y-2x+3) - 8 = 5x - 15 + 2y + 8 - \frac{7}{3}y + \frac{14}{3}x - 7 - 8 = \frac{29}{3}x - \frac{7}{3}y - 22$$

$$\text{ c) } 15 \cdot \left[ \frac{2(x-3)}{3} - \frac{4(y-x)}{5} + \frac{x+2}{15} - 7 \right] = 10x - 30 - 12y + 12x + x + 2 - 105 = 23x - 12y - 133$$

$$\text{ d) } (x^2-2x+7)(5x^3+3) - (2x^5-3x^3-2x+1) = 5x^5 + 3x^2 - 10x^4 - 6x + 35x^3 + 21 - 2x^5 + 3x^3 + 2x - 1 = 3x^5 - 10x^4 + 38x^3 + 3x^2 - 4x + 20$$

$$(49.) \text{ a) } 8\left(\frac{x}{2} + \frac{x}{4} - \frac{x}{8} - \frac{3x}{4} - \frac{1}{4}\right) = 4x + 2x - x - 6x - 2 = -x - 2$$

$$\text{ b) } 9 \cdot \left(x + \frac{2x-3}{3} + \frac{x-1}{3} - \frac{12x+4}{9}\right) = 9x + 2x - 3 + 3x - 3 - 12x - 4 = 2x - 10$$

$$\text{ c) } 8\left(\frac{(2x-4)^2}{2} - \frac{x(x+1)}{2} - 5\right) = 4x^2 - 16x + 16 - 4x^2 - 4x - 40 = -20x - 24$$

$$\text{ d) } 12\left(\frac{3(2x+1)}{4} + \frac{3x+5}{2} - \frac{5(4x+1)}{6} + \frac{25}{12}\right) = 9x + 18 + 18x + 30 - 40x - 10 + 25 = -13x + 63$$

$$e) 36 \cdot \left( \frac{x-1}{4} + 36 \cdot \frac{x+7}{6} - \left( \frac{4x+7}{9} + 11 \right) \right) = 4x-9 + 1296 - 6x-42 - 16x-28 - 396 = -13x+110$$

$$f) 20 \left( \frac{(x+2)^2}{5} - \frac{x^2-9}{4} + \frac{(x+3)^2}{2} + \frac{1}{5} \right) = 4(x^2+4x+4) - 5(x^2-9) + 10(x^2+6x+9) + 4 = 4x^2+16x+16 - 5x^2+45+10x^2+60x+90+4 = 9x^2+76x+155$$

$$50) a) 4x^2-25 = (2x-5)(2x+5); b) x^2+16+8x = (x+4)^2; c) x^2+2x+1 = (x+1)^2;$$

$$d) 9x^2+6x+1 = (3x+1)^2; e) 4x^2+25-20x = (2x-5)^2; f) \frac{x^2}{4} + x + 1 = \left( \frac{x}{2} + 1 \right)^2;$$

$$g) 144(x^2)^2 - x^2 = (12x^2-x)(12x^2+x); h) \frac{(x^3)^2}{25} + \frac{x^3}{5} + \frac{1}{4} = \left( \frac{x^3}{5} + \frac{1}{2} \right)^2;$$

$$i) 16x^4-9 = (4x^2-3)(4x^2+3); j) \frac{x^6}{100} + \frac{8x^3}{5} + 64 = \left( \frac{x^3}{10} + 8 \right)^2$$

$$51) a) x^2-2x+1 = (x-1)^2; b) 4x^2+24x+36 = (2x+6)^2; c) 9x^2-25 = (3x+5)(3x-5);$$

$$52) a) (x+2)(x-2) - (x^2+4) = x^2-4-x^2-4 = -8; d) \frac{1}{4}x^2 + x + 1 = \left( \frac{x}{2} + 1 \right)^2$$

$$b) (3x-1)^2 - (3x+1)^2 = 9x^2-6x+1 - 9x^2-6x-1 = -12x$$

$$c) 2(x-5)^2 - (2x^2+3x+50) = 2x^2-20x+50 - 2x^2-3x-50 = -23x$$

$$d) (5x-4)(2x+3) - 5 = 10x^2+15x-8x-12 - 5 = 10x^2+7x-17; e) 3(x^2+5) - (x^2+40) = 2x^2-25;$$

$$f) (x+3)^2 - (x^2+(x-3)^2) = x^2+6x+9 - x^2-x^2+x+6x-9 = -x^2+12x$$

$$53) a) 5x^2-15x^3+25x^4 = 5x^2(1-3x+5x^2); b) \frac{x^6}{3} - \frac{x}{9} - \frac{1}{15} = \frac{1}{3} \left( \frac{x^4-x}{3} - \frac{1}{5} \right);$$

$$c) 2x^3y^5 - 3x^2y^4 + 2x^7y^2 + 7x^3y^3 = x^2y^2(2xy^3 - 3y^2 + 2x^5 + 7xy);$$

$$d) 2x^2y - 5x^3y(2y-3) = x^2y(2 - 5x(2y-3)) = x^2y(2 - 10xy + 15x);$$

$$e) 2(x-3) + 3(x-3) - 5(x-3) = 0; f) 2xy^2 - 6x^2y^3 + 4xy^3 = 2xy^2(1 - 3xy + 2y);$$

$$g) \frac{x^2-3}{2}(y-1) - \frac{7}{2}(y-1) = \frac{y-1}{2}(x^2-3-7) = \frac{y-1}{2}(x^2-10);$$

$$h) \frac{(2x^2+1)^2}{3} - \frac{4}{3}(2x^2+1) = \frac{2x^2+1}{3}(2x+1-4) = \frac{2x^2+1}{3}(2x-3);$$

$$i) 12x^3 - 8x^5 + 4x^2y - \frac{4}{3}x^2 = 4x^2(3x - 2x^3 + y^2 - 1/3);$$

$$j) (x^2-1) + (x^2-2x+1) - (4x-4) = x^2-1+x^2-2x+1-4x+4 = 2x^2-6x+4 = 2(x^2-3x+2)$$

$$k) 6(x^2-4x+4) - (2x^2-8) + (30x-60) = 6x^2-24x+24 - 2x^2+8+30x-60 = 4x^2+6x-28 = 2(2x^2+3x-14)$$

$$l) 9x^2 - 18xy^2 - 6xyz + 6x = 3x(3x - 6y^2 - 2yz + 2)$$

$$54) a) \begin{array}{r} x^5 - 7x^4 + 3x^2 - 8 \\ -x^5 + 3x^4 - x^3 \\ \hline -4x^4 - x^3 + 3x^2 \\ -4x^4 + 12x^3 + 4x^2 \\ \hline -13x^3 + 7x^2 \\ -13x^3 + 39x^2 + 13x \\ \hline -32x^2 + 13x - 8 \\ -32x^2 + 96x + 32 \\ \hline -83x + 24 \end{array}$$

$$\begin{array}{r}
 b) \quad 6x^4 + 3x^3 - 2x \\
 \underline{-6x^4 - 4x^2} \quad -2x \\
 3x^3 - 4x^2 - 2x \\
 \underline{-3x^3} \quad -2x \\
 -4x^2 - 4x - 2x \\
 4x^2 + 8 \\
 \underline{-4x + 8} \\
 3
 \end{array}
 \quad
 \begin{array}{r}
 3x^2 + 2 \\
 \underline{2x^2 + x - 4} \\
 3
 \end{array}$$

$$c) \quad \begin{array}{r|rrrrr}
 & 5 & 0 & 6 & -11 & +13 \\
 2 & & 10 & 20 & 52 & 82 \\
 \hline
 & 5 & 10 & 26 & 41 & 95
 \end{array}$$

$$c(x) = 5x^3 + 10x^2 + 26x + 41$$

$$R = 95$$

55) a)  $2x + x^2$ ; b)  $x(x+1)$ ; c)  $\frac{x+3}{2}$ ; d)  $3x-7$

56) a)  $x + \frac{y^2}{2}$ ; b)  $(x-y)^2$ ; c)  $x-5 + y-5 \Rightarrow x+y-10$

57) a)  $(2x+10) \cdot (2x+18) - 10 \cdot 18 = 140$ ; b)  $121(20+15x)$

58) A: A=e, P=d; B: A=a, P=d; C: A=f, P=b

59) A: A=xy; P=2x+2y; B: (x-1)y=A, P=2x-2+2y; C: A=x(y-1), P=2x+2y+2

60) a)  $-5xy \rightarrow$  Grado 2; b)  $(-7x)^3 \rightarrow$  Grado 3; c)  $8x \rightarrow$  Grado 1  
 d)  $(xy)^2 \rightarrow$  Grado 4; e)  $\frac{2}{3} \rightarrow$  Grado 0; f)  $\frac{4}{5}x^3 \rightarrow$  Grado 3; g)  $\frac{-3yx}{5} \rightarrow$  Grado 2

61) a)  $(6x^2)(-3x) = -18x^3$ ; b)  $(2xy^2)(4x^2y) = 8x^3y^3$ ; h)  $\frac{1}{2}x \rightarrow$  Grado 1

c)  $(\frac{3}{4}x^3)(\frac{1}{2}x^3) = \frac{3}{8}x^6$ ; d)  $(\frac{1}{4}xy)(\frac{3xz}{2}) = \frac{3}{8}x^2yz$

62) a)  $x(x^2-5) - 3x^2(x+2) - 7(x^2+1) = x^3 - 5x - 3x^3 - 6x^2 - 7x^2 - 7 = -2x^3 - 13x^2 - 5x - 7$

b)  $5x^2(-3x+1) - x(2x-3x^2) - 2 \cdot 3x = -15x^3 + 5x^2 - 2x + 3x^3 - 6x = -12x^3 + 3x^2 - 6x$

63) a)  $x^3 - 7x + 6$ :  $(-1)^3 - 7(-1) + 6 = 12 \neq 0$ ;  $1^3 - 7 \cdot 1 + 6 = 0$ ;  $2^3 - 7 \cdot 2 + 6 = 0$   
 $3^3 - 7 \cdot 3 + 6 = -6 \neq 0$       1 y 2 son raíces

b)  $x^3 - 3x^2 + 4x - 12$ :  $(-1)^3 - 3(-1)^2 + 4(-1) - 12 = -20 \neq 0$ ;  $1^3 - 3 \cdot 1^2 + 4 \cdot 1 - 12 = -10 \neq 0$   
 $2^3 - 3 \cdot 2^2 + 4 \cdot 2 - 12 = -8 \neq 0$ ;  $3^3 - 3 \cdot 3^2 + 4 \cdot 3 - 12 = 0$       3 es raíz

c)  $x^3 - 3x^2 - x + 3$ :  $(-1)^3 - 3(-1)^2 - 1 + 3 = 0$ ;  $1^3 - 3 \cdot 1^2 - 1 + 3 = 0$ ;  $2^3 - 3 \cdot 2^2 - 2 + 3 = -3$   
 $3^3 - 3 \cdot 3^2 - 3 + 3 = 0$       -1, 1 y 3 son raíces

64) a)  $(2x^2+3)(x-1) - x(x-2) = 2x^3 - 2x^2 + 3x - 3 - x^2 + 2x = 2x^3 - 3x^2 + 5x - 3$

b)  $(x^2-5x+3)(x^2-x) - x(x^3-3) = x^4 - x^3 - 5x^3 + 5x^2 + 3x^2 - 3x - x^4 + 3x = -6x^3 + 8x^2$

c)  $(\frac{1}{2}x^2 + \frac{5}{3}x + \frac{1}{6})(6x-12) = 3x^3 + 10x^2 + x - 6x^2 - 20x - 2 = 3x^3 + 4x^2 - 19x - 2$

65) A+B =  $2x^4 + 4x^3 - 5x^2 - x + 3$ ; A-C =  $4x^3 - 8x^2 + 8x - 1$ ; A-B+C =  $-2x^4 + x^3 - 2x^2 - 4x - 5$

66: a)  $5x - x^2 + 7x^2 - 9x + 2 = 6x^2 - 4x + 2$ ; b)  $2x + 7y - 3x + y - x^2 = -x^2 - x + 8y$

c)  $x^2y^2 - 3x^2y - 5xy^2 + x^2y + xy^2 = x^2y^2 - 2x^2y - 4xy^2$

67: a) 
$$\begin{array}{r} x^3 + 2x^2 + 1 \quad | \quad x^2 + 1 \\ -x^3 \quad -x \quad \quad \quad x + 2 \\ \hline 2x^2 - x + 1 \\ -2x^2 \quad \quad -2 \\ \hline -x - 1 \end{array}$$

b) 
$$\begin{array}{r} 2x^3 - x^2 - x + 1 \quad | \quad x^2 - 1 \\ -2x^3 \quad + 2x \quad \quad \quad 2x - 1 \\ \hline -x^2 + x + 1 \\ x^2 \quad \quad -1 \\ \hline x \end{array}$$

c) 
$$\begin{array}{r} x^3 - 3x^2 + 2x - 2 \quad | \quad x^2 + x - 1 \\ -x^3 \quad -x + x \quad \quad \quad x - 4 \\ \hline -4x^2 + 3x - 2 \\ 4x^2 + 4x - 4 \\ \hline 7x - 6 \end{array}$$

d) 
$$\begin{array}{r} x^4 - 5x^3 + 2x \quad | \quad x^2 - 2x + 1 \\ -x^4 + 2x^3 - x^2 \quad \quad \quad x^2 - 3x - 7 \\ \hline 3x^3 - x^2 + 2x \\ 3x^3 - 6x^2 + 3x \\ \hline -7x^2 + 5x \\ 7x^2 - 14x + 7 \\ \hline -9x + 7 \end{array}$$

68: a)  $x^2 + 2x - 3 = (x-1)(x+3)$

b)  $x^2 - 4x - 5 = (x+1)(x-5)$ ; c)  $2x^2 - 5x + 2 = 2(x-2)(x-1/2) = (x-2)(2x-1)$

d)  $x^2 - x - 6 = (x+2)(x-3)$ ; e)  $2x^2 - x - 3 = 2(x-3/2)(x+1) = (2x-3)(x+1)$

f) 
$$\begin{array}{c|cccc} 1 & 1 & -1 & -4 & 4 \\ & & 1 & 0 & -4 \\ \hline 1 & 1 & 0 & -4 & 0 \end{array} \quad x^3 - x^2 - 4x + 4 = (x-1)(x-4) = (x-1)(x-2)(x+2)$$

69: a)  $x^3 - 3x^2 + 2x = x(x^2 - 3x + 2) = x(x-1)(x-2)$

b)  $x^4 - 2x^3 - 3x^2 = x^2(x^2 - 2x - 3) = x^2(x+1)(x-3)$

c) 
$$\begin{array}{c|cccc} 1 & 1 & -1 & -5 & -3 \\ 3 & & 3 & 6 & 3 \\ \hline 1 & 2 & 1 & 0 & \end{array} \quad x^3 - x^2 - 5x - 3 = (x-3)(x^2 + 2x + 1) = (x-3)(x+1)^2$$

d) 
$$\begin{array}{c|cccc} 1 & 1 & 2 & -9 & -18 \\ -2 & & -2 & 0 & 18 \\ \hline 1 & 0 & -9 & 0 & \end{array} \quad x^3 + 2x^2 - 9x - 18 = (x+2)(x^2 - 9) = (x+2)(x-3)(x+3)$$

70: a) 
$$\begin{array}{c|cccc} 1 & 1 & 0 & -7 & -6 \\ -1 & & -1 & 1 & 6 \\ \hline 1 & 1 & -1 & -6 & 0 \end{array} \quad x^3 - 7x - 6 = (x+1)(x^2 - x - 6) = (x+1)(x+2)(x-3)$$

b)  $x^4 + 3x^2 - 4x = x(x^3 + 3x - 4) = x(x-1)(x^2 + x + 4)$

$$\begin{array}{c|cccc} 1 & 1 & 0 & 3 & -4 \\ 1 & & 1 & 1 & 4 \\ \hline 1 & 1 & 4 & 0 & \end{array}$$



c) 
$$\begin{array}{c|cccc} 1 & 1 & 0 & -3 & 2 \\ \hline 1 & 1 & 1 & -2 & \\ \hline 1 & 1 & -2 & 0 & \end{array}$$

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

$$d) x^4 - x^2 = x^2(x^2 - 1) = x^2(x-1)(x+1)$$

(71) a)  $P(x) = x^3 + 2x^2 - 9x - 18 = (x+2)(x-3)(x+3)$

b)  $T(x) = x^4 - 2x^3 - 3x^2 = x^2(x^2 - 2x - 3) = x^2(x+1)(x-3)$

(72) a)  $180x^3 - 80x = 20x(9x^2 - 4) = 20x(3x-2)(3x+2)$

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

(73) a) 
$$\begin{array}{c|ccc} 1 & 1 & -5 & 6 \\ \hline 2 & & 2 & -6 \\ \hline 1 & 1 & -3 & 0 \end{array}$$

$C(x) = x - 3$ ;  $R = 0$

b) 
$$\begin{array}{c|cccc} 1 & 1 & -3 & 0 & 5 \\ \hline -1 & & -1 & 4 & -4 \\ \hline 1 & 1 & -4 & 4 & 1 \end{array}$$

$C(x) = x^2 - 4x + 4$ ;  $R = 1$

c) 
$$\begin{array}{c|cccc} 1 & 2 & 0 & -4 & 7 \\ \hline 1 & 2 & 2 & -2 & \\ \hline 1 & 2 & 2 & -2 & 5 \end{array}$$

$C(x) = 2x^2 + 2x - 2$ ;  $R = 5$

d) 
$$\begin{array}{c|cccc} 1 & 1 & -4 & -7 & 10 \\ \hline -2 & & -2 & 12 & -10 \\ \hline 1 & 1 & -6 & 5 & 0 \end{array}$$

$C(x) = x^2 - 6x + 5$ ;  $R = 0$

e) 
$$\begin{array}{c|ccc} 1 & -1 & 3 & -7 \\ \hline 3 & & -3 & 0 \\ \hline 1 & -1 & 0 & -7 \end{array}$$

$C(x) = -x$   
 $R = -7$

(74) a)  $2x(x-2) + x^2(x-2) - 3(x-2) = (x-2)(2x + x^2 - 3)$

b)  $x^2(x+1) - x^2(x+2) + 2x^2(x-3) = x^2(x+1-x-2+2x-6) = x^2(2x-7)$

c)  $3x^2(x+3) - 6x(x+3) = (x+3)(3x^2 - 6x) = (x+3)3x(x-2)$

(75) a)  $x^2 + 49 - 14x = (x-7)^2$ ; b)  $x^2 + 1 - 2x = (x-1)^2$ ; c)  $4x^2 + 1 + 4x = (2x+1)^2$

(76) a)  $4x^2 - 49 = (2x-7)(2x+7)$       d)  $x^2 + 12x + 36 = (x+6)^2$

b)  $x^2 - 18x + 81 = (x-9)^2$ ; c)  $9x^2 + 12x + 4 = (3x+2)^2$ ; d)  $121 - 100x^2 = (11-10x)(11+10x)$

(77) a)  $18 \left[ \frac{(2x-5)^2}{9} - \frac{(x+1)^2}{6} \right] = 2(4x^2 - 20x + 25) - 3(x^2 + 2x + 1) = 8x^2 - 40x + 50 - 3x^2 - 6x - 3 = 5x^2 - 46x + 47$

b)  $8 \left[ \frac{x(x-3)}{2} + \frac{x(x+2)}{4} - \frac{(3x+2)^2}{8} \right] = 4x^2 - 12x + 2x^2 + 4x - 9x^2 - 12x - 4 = -3x^2 - 20x - 4$

c)  $30 \left[ \frac{x(x-2)}{15} - \frac{(x+1)^2}{6} + \frac{1}{2} \right] = 2x^2 - 4x - 5(x^2 + 2x + 1) + 15 = -3x^2 - 14x + 10$

d)  $6 \left( \frac{5x-4}{6} + \frac{2x-3}{2} - \frac{x-1}{3} \right) = 5x - 4 + 6x - 9 - 2x + 2 = 9x - 11$

$$e) 12 \left( \frac{x+6}{3} - \frac{x+1}{2} + \frac{3x-1}{4} \right) = 4x+24-6x-6+9x-3 = 7x+15$$

$$f) 20 \left[ \frac{2(x-1)}{10} - \frac{x(x+1)}{5} + \frac{1}{4} \right] = 4x-4-4x^2-4x+5 = -4x^2+1$$

$$78: a) (x+6)^2 = x^2+12x+36; b) (7-x)^2 = 49-14x+x^2; c) (3x-2)^2 = 9x^2-12x+4;$$

$$d) (x+1/2)^2 = x^2+x+1/4; e) (x-2y)^2 = x^2-4xy+4y^2; f) \left(\frac{2}{5}x - \frac{1}{3}y\right)^2 = \frac{4x^2}{25} - \frac{4xy}{15} + \frac{y^2}{9}$$

$$79: a) (x+7)(x-7) = x^2-49; b) (3+x)(3-x) = 9-x^2; c) (3+4x)(3-4x) = 9-16x^2;$$

$$d) (x^2+1)(x^2-1) = x^4-1; e) \left(\frac{1}{2}x-1\right)\left(\frac{1}{2}x+1\right) = \frac{x^2}{4}-1; f) \left(1+\frac{1}{x}\right)\left(1-\frac{1}{x}\right) = 1-\frac{1}{x^2}$$

$$80: a) x^2+4+4x; b) x^2+25-10x; c) x^2+9+6x; d) x^2+16+8x$$

$$81: a) 12x^3-8x^2-4x = 4x(3x^2-2x-1); b) -3x^3+x-x^2 = x(-3x^2+1-x);$$

$$c) 2xy-4xy+x^2y = xy(2y-4x+xy); d) \frac{2}{3}x^2 + \frac{1}{3}x^3 - \frac{5}{3}x = \frac{x}{3}(2x+x^2-5)$$

$$82: a) x+7 = 2(y+7); b) 2'5x+5y = 1500; c) 4x-y = 60; d) (x-y)^3 = 8$$

$$83: a) \frac{3x+5}{2x+3} - \frac{x-7}{2x+3} - \frac{2x+2}{2x+3}; b) \frac{5x+4}{x} + \frac{x-2}{2x} - \frac{2(5x+4)+x-2}{2x} = \frac{1x+6}{2x}$$

$$c) \frac{3}{x^2} + \frac{x+3}{x} - \frac{x^2+3x+3}{x^2}; d) \frac{3x}{x-1} - \frac{2}{x+1} = \frac{3x(x+1)-2(x-1)}{(x-1)(x+1)} = \frac{3x^2+x+2}{x^2-1}$$

$$84: a) \frac{3x^3-12x}{x^2+4x+4} - \frac{3x(x^2-4)}{(x+2)^2} - \frac{3x(x-2)(x+2)}{(x+2)^2} - \frac{3x(x-2)}{x+2} = \frac{3x^2-6x}{x+2}$$

$$b) 1 - \frac{x}{3} \left( \frac{x+2}{2} - \frac{x^2+1}{2x} \right) - 1 - \frac{x}{3} \left( \frac{x^2+2x-x^2+1}{2x} \right) = 1 - \frac{2x+1}{6} = \frac{5-2x}{6}$$

$$c) \frac{x^2-10x+25}{3x^3-15x^2} = \frac{(x-5)^2}{3x^2(x-5)} = \frac{x-5}{3x^2}$$

$$d) \left(x - \frac{1}{x}\right) \left(1 + \frac{1}{x^2}\right) = \frac{x^2-1}{x} \cdot \frac{x^2+1}{x^2} = \frac{x^4-1}{x^3}$$

$$85: a) \frac{2}{x} + \frac{3}{2x} + \frac{x-2}{x} = \frac{4+3+2x-4}{2x} = \frac{2x+3}{2x}$$

$$b) \frac{3}{x+1} - \frac{2x^2+8x}{x^2+x} - 4x = \frac{3}{x+1} - \frac{2x(x+4)}{x(x+1)} - 4x = \frac{3-2x-8-4x^2-4x}{x+1} = \frac{-4x^2-6x-5}{x+1}$$

$$c) \frac{2}{x^2-9} - \frac{7x}{x-3} + 3 = \frac{2-7x^2+21x+3x^2-27}{x^2-9} = \frac{-4x^2+21x-25}{x^2-9}$$

$$d) \frac{5x^3+15x^2}{x+3} - \frac{10x^3+15x^2}{5x^2} + 2x = \frac{5x^2(x+3)}{x+3} - \frac{5x^2(2x+3)}{5x^2} + 2x = 5x^2-2x-3+2x = 5x^2-3$$

$$86: a) \frac{2x-7}{x} - \frac{3}{x+1} = \frac{6x-21}{x^2+x}; b) \frac{5}{x-3} : \frac{x}{x^2+1} = \frac{5x^2+5}{x^2-3x};$$

$$c) \frac{3}{x} \cdot \left( \frac{5x+3}{x-1} : \frac{5x+3}{x} \right) = \frac{3}{x} \cdot \frac{x}{x-1} = \frac{3}{x-1}$$

$$87: a) \frac{x^2-1}{x} : (x-1) = \frac{x+1}{x}; b) \frac{x(x-2)}{x} : \frac{x^2-6}{x+2} = 1; c) \frac{x^2-2x+1}{x} : \frac{x-1}{x} = x-1;$$

$$d) 6x^2 \cdot \frac{x-3}{x^3} = \frac{6x-18}{x}; \quad e) \frac{3x-3}{x^2} \cdot \frac{x(x+1)}{x^2-1} = \frac{3}{x}; \quad f) \frac{2x}{x-1} : \frac{4x^2}{2x-2} = \frac{4(x-1)}{4x(x-1)} = \frac{1}{x};$$

$$g) \frac{x+5}{10} \cdot \frac{5}{(x+5)^2} = \frac{1}{2x+10}; \quad h) \frac{2x^2}{3x} \cdot \frac{6x}{4x^3} = \frac{1}{x}$$

$$i) \frac{4x-3}{2x} \cdot \frac{4x^2}{8x-6} = \frac{4x^2(4x-3)}{4x(4x-3)} = x; \quad j) \frac{3x-3}{x^2} \cdot \frac{3x}{18(x-1)} = \frac{9x(x-1)}{18x(x-1)} = \frac{1}{2x}$$

$$88) a) \frac{6x^2}{4x^2-9} : \left( \frac{5x}{2x-3} + \frac{5x}{2x+3} \right) = \frac{6x^2}{4x^2-9} \cdot \frac{10x^2+15x+10x^2-15x}{4x^2-9} = \frac{6x}{20x^2} = \frac{3}{10x}$$

$$b) \frac{x^2}{5x^2-25} - \frac{1}{5} = \frac{x^3+x^2}{(x+1)(5x^2-25)} = \frac{x^2}{5(x^2-5)} - \frac{1}{5} = \frac{x^2(x+1)}{(x+1)5(x^2-5)} = -\frac{1}{5}$$

$$89) a) \frac{15x^2}{5x^2(x-3)} = \frac{3}{x-3}; \quad b) \frac{3(x-1)^2}{9(x-1)} = \frac{x-1}{3}; \quad c) \frac{3x^2-9x^3}{15x^3-3x^4} = \frac{3x^2(1-3x)}{3x^3(5-3x)} = \frac{1-3x}{5x-3x^2};$$

$$d) \frac{9(x+1)-3(x+1)}{2(x+1)} = 3; \quad e) \frac{5x^2(x-3)^2(x+3)}{15x(x-3)} = \frac{x(x^2-9)}{3} = \frac{x^3-9x}{3};$$

$$f) \frac{x(3x^3-x^2)}{(3x-1)x^3} = \frac{x^3(3x-1)}{(3x-1)x^3} = 1$$

$$90) a) \frac{9x}{12x^2} - \frac{3}{4x}; \quad b) \frac{x(x+1)}{5(x+1)} = \frac{x}{5}; \quad c) \frac{x^2(x+2)}{2x^3} = \frac{x+2}{2x}$$

$$91) a) \frac{x^2-4x}{x^2} = \frac{x-4}{x}; \quad b) \frac{3x}{x^2+2x} = \frac{3}{x+2}; \quad c) \frac{3x+3}{(x+1)^2} = \frac{3}{x+1};$$

$$d) \frac{2x^2+4x}{x^3+2x^2} = \frac{2x(x+2)}{x^2(x+2)} = \frac{2}{x}; \quad e) \frac{8x^3-4x^2}{(2x-1)^2} = \frac{4x^2(2x-1)}{(2x-1)^2} = \frac{4x^2}{2x-1}$$

$$f) \frac{5x^3+5x}{x^4+x^2} = \frac{5x(x^2+1)}{x^2(x^2+1)} = \frac{5}{x}$$

$$92) a) \frac{5x^2}{15x} = \frac{x}{3}; \quad b) \frac{2x(x-3)}{6(x-3)} = \frac{x}{3}; \quad c) \frac{12x-4}{3x-1} = 4; \quad d) \frac{x+5}{(x+5)^2} = \frac{1}{x+5};$$

$$e) \frac{2x^2-4x}{x-2} = \frac{2x(x-2)}{x-2} = 2x; \quad f) \frac{x^2-2x}{3x} = \frac{x-2}{3}$$

$$93) a) \frac{2x+4}{3x^2+6x} = \frac{2(x+2)}{3x(x+2)} = \frac{2}{3x}; \quad b) \frac{x+1}{x^2-1} = \frac{1}{x-1}; \quad c) \frac{x-2}{x^2+4-4x} = \frac{1}{x-2};$$

$$d) \frac{x^2-3x}{x^2-9} = \frac{x(x-3)}{(x-3)(x+3)} = \frac{x}{x+3}; \quad e) \frac{x^2-4}{x^2+4x+4} = \frac{x-2}{x+2}; \quad f) \frac{x^3+2x^2+x}{3x+3} = \frac{x(x+1)}{3} = \frac{x+x}{3}$$

$$94) a) \left(x - \frac{4}{x}\right) : \left(\frac{1}{2} + \frac{1}{x}\right) = \frac{x^2-4}{x} : \frac{x+2}{2x} = \frac{x-2}{2}$$

$$b) \left(\frac{2}{x} - \frac{1}{3+x}\right) \cdot \frac{x^2}{2} = \frac{2(3+x)}{2} \cdot \frac{x^2}{2} = 3x+x^2$$

$$c) \left(x - \frac{9}{x}\right) \cdot \frac{2}{x+3} = \frac{x^2-9}{x} \cdot \frac{2}{x+3} = \frac{2(x-3)}{x} = \frac{2x-6}{3}$$