Ex 2.4.1

a) $\frac{54a^3b^3}{15a^5b^2} = \frac{18b}{5a^2}$

b) $\frac{-16u^2v^2w^3}{-4u^3vw^2} = \frac{4vw}{u}$

c) $\frac{x-1}{2x-2} = \frac{x-1}{2(x-1)} = \frac{1}{2}$

d) $\frac{2x-2y}{3y-3x} = \frac{2(x-y)}{3(y-x)} = \frac{2(x-y)}{-3(x-y)} = -\frac{2}{3}$

e) $\frac{a^2-b^2}{(a-b)^2} = \frac{(a+b)(a-b)}{(a-b)^2} = \frac{a+b}{a-b}$

f) $\frac{x^2-16}{x^2-5x+4} = \frac{(x+4)(x-4)}{(x-4)(x-1)} = \frac{x+4}{x-1}$

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

h) $\frac{3z^2-21z+36}{2z^2-12z+18} = \frac{3(z^2-7z+12)}{2(z^2-6z+9)} = \frac{3(z-4)(z-3)}{2(z-3)^2} = \frac{3(z-4)}{2(z-3)}$

i) $\frac{x^3-15x^2+75x-125}{x^2-25} = \frac{(x-5)^3}{(x+5)(x-5)} = \frac{(x-5)^2}{x+5}$

j) $\frac{x^4-y^4}{x^5-x^3y^2} = \frac{(x^2+y^2)(x^2-y^2)}{x^3(x^2-y^2)} = \frac{x^2+y^2}{x^3}$

k) $\frac{10x^2-10xy}{5x^2y^2-5x^4} = \frac{10x(x-y)}{5x^2(y^2-x^2)} = \frac{10x(x-y)}{5x^2(y+x)(y-x)} = \frac{2}{-x(y+x)} = -\frac{2}{x(x+y)}$

l) $\frac{6x^2+2x}{27x^3+1} = \frac{2x(3x+1)}{(3x+1)(9x^2-3x+1)} = \frac{2x}{9x^2-3x+1}$

m) $\frac{1-x^2+x^3-x^5}{x+x^2-x^3-x^4} = \frac{(1-x^2)+x^3(1-x^2)}{x(1+x-x^2-x^3)} = \frac{(1-x^2)(1+x^3)}{x[(1+x)-x^2(1+x)]} = \frac{(1+x)(1-x)(1+x)(1-x+x^2)}{x(1+x)(1-x^2)}$

$= \frac{1-x+x^2}{x}$

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

o) $\frac{2x^3+9x^2+7x-6}{2x^3+x^2-13x+6}$

$N(-2) = -16+36-14-6 = 0$

	2	9	7	-6
-2		-4	-10	6
	2	5	-3	0

$D(2) = 16+4-26+6$

	2	1	-13	6
2		4	10	-6
	2	5	-3	0

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

Ex 2.4.2

a) $\frac{a+7}{a-1} \cdot \frac{a^2-1}{2a+14} = \frac{(a+7)(a+1)(a-1)}{(a-1)\cdot 2(a+7)} = \frac{a+1}{2}$

b) $\frac{x+5}{7} : \frac{2x+10}{x-8} = \frac{x+5}{7} \cdot \frac{x-8}{2(x+5)} = \frac{x-8}{14}$

c) $(x+y) : \frac{x+y}{x-y} = \frac{x+y}{1} \cdot \frac{x-y}{x+y} = \frac{(x+y)(x-y)}{x+y} = x-y$

d) $\frac{z^2+z}{z-1} \cdot \frac{z-z^2}{z^3} = \frac{z(z+1)\cdot z(1-z)}{(z-1)\cdot z^3} = \frac{-z^2(z+1)(z-1)}{z^3(z-1)} = -\frac{(z+1)}{z}$

e) $\frac{x+2}{2x-3} : \frac{x^2-4}{2x^2-3x} = \frac{x+2}{2x-3} \cdot \frac{x(2x-3)}{(x+2)(x-2)} = \frac{x}{x-2}$

f) $\frac{9x^2-4}{3x^2-5x+2} \cdot \frac{9x^4-6x^3+4x^2}{27x^4+8x} = \frac{(3x+2)(3x-2)}{(3x-2)(x-1)} \cdot \frac{x^2(9x^2-6x+4)}{x(3x+2)(9x^2-6x+4)} = \frac{x}{x-1}$

g) $\frac{x^2-6x+9}{x^2-1} \cdot \frac{2x-2}{x-3} = \frac{(x-3)^2 \cdot 2(x-1)}{(x+1)(x-1)(x-3)} = \frac{2(x-3)}{x+1}$

h) $\frac{6x^2-5x-6}{x^2-4} : \frac{2x^2-3x}{x+2} = \frac{(3x+2)(2x-3)}{(x+2)(x-2)} \cdot \frac{x+2}{x(2x-3)} = \frac{3x+2}{x(x-2)}$