2.2.7 Décomposer en facteurs après avoir groupé.

a) $x - 2y - x^2 + 2xy + (x-2y)^2$

b) $2x^2 + 3x - 10xy - 15y$

c) $3x^3 - 20y^2z - 5z + 12x^3y^2$

a) $(x-2y) - x(x-2y) + (x-2y)^2$

$$= (x-2y)\left[1 - x + (x-2y)\right] = (x-2y)(1-x+x-2y)$$

$$= (x-2y)(1-2y)$$

b) $x(2x+3y) - 5y(2x+3y) = (2x+3y)(x-5y)$

c) $3x^3 + 12x^3y^2 - 20y^2z - 5z =$

$$3x^3(1+4y^2) - 5z(4y^2+1) = (1+4y^2)(3x^3-5z)$$

d) $8x + (2x+3y)(x-2y) - 6x^2 + 12y - 9xy + (2x+3y)^2$

$$= 8x + 12y - (6x^2 + 9xy) + (2x+3y)(x-2y) + (2x+3y)^2$$

$$= 4(2x+3y) - 3x(2x+3y) + (2x+3y)(x-2y) + (2x+3y)^2$$

$$= (2x+3y)(4 - 3x + x - 2y + 2x + 3y)$$

$$= (2x+3y)(4+y)$$

e) $\dfrac{xz}{2} - \dfrac{x}{4} + \dfrac{yz}{3} - \dfrac{y}{6} = \dfrac{1}{12}\left(6xz - 3x + 4yz - 2y\right)$

$$= \dfrac{1}{12}\left(3x(2z-1) + 2y(2z-1)\right) = \dfrac{1}{12}(2z-1)(3x+2y)$$

f) $x^5 - \frac{4}{5}x^2y - \frac{5}{4}x^3z + yz = \frac{1}{20}\left(20x^5 - 16x^2y - 25x^3z + 20yz\right)$

$= \frac{1}{20}\left(5x^3\left(4x^2 - 5z\right) - 4y\left(4x^2 - 5z\right)\right)$

$= \frac{1}{20}\left(4x^2 - 5z\right)\left(5x^3 - 4y\right)$

g) $\frac{2}{9}x^2y^3 - \frac{1}{20}x^2 + \frac{40}{27}y^3 - \frac{1}{3} = x^2\left(\frac{2}{9}y^3 - \frac{1}{20}\right) + \frac{20}{3}\left(\frac{2}{9}y^3 - \frac{1}{20}\right)$

$= \left(\frac{2}{9}y^3 - \frac{1}{20}\right)\left(x^2 + \frac{20}{3}\right)$

h) $3x^4y^3z + x^4y^3 + 3x^3y^4z - 3x^2y^5z - x^2y^5$ $+ x^3y^4$ ⚠ corriger la donnée

$= x^2y^3\left(3x^2z + x^2 + 3xyz - 3y^2z - y^2 + xy\right)$

$= x^2y^3\left(x^2(3z+1) + xy(3z+1) - y^2(3z+1)\right)$

$= x^2y^3\left(3z+1\right)\left(x^2 + xy - y^2\right)$