TC 2.1

1MR

a) $\dfrac{1}{\dfrac{1+x-x}{x(1+x)}} \cdot \dfrac{1}{x} = \dfrac{x(1+x)}{1} \cdot \dfrac{1}{x} = \dfrac{x \cdot (1+x)}{x \cdot 1} = 1+x$

$$\frac{\dfrac{1}{1+x} - \dfrac{1}{x}}{x} \cdot \frac{1}{x} = \frac{\dfrac{x-(1+x)}{x(1+x)}}{\dfrac{x}{1}} \cdot \frac{1}{x} = \frac{-1}{x(1+x)} \cdot \frac{1}{x} \cdot \frac{1}{x}$$

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

Finalement,

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

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

$$\boxed{\frac{x^5+2x^4+x^3-1}{x^4+x^3}}$$

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

$= x^6 - 3x^4 + 3x^2 - 1$

c) $x^3 + 6x^2 + 11x + 6 = (x+1)(x+3)(x+2)$

d) $\dfrac{4x}{(x-1)^2(x+1)}$

e) $1+z^4 = z^4 + 1 + 2z^2 - 2z^2 = z^4 + 2z^2 + 1 - 2z^2$

$= (z^2+1)^2 - 2z^2 = (z^2 - \sqrt{2}z + 1) \cdot (z^2 + \sqrt{2}z + 1)$

f) $0{,}1(x + 10{,}001)(x - 0{,}001) = 0{,}1(x^2 - 0{,}001x + 10{,}001x - 10{,}001 \cdot 0{,}001)$

$= 0{,}1x^2 + x - 0{,}0010001$

g) $10^5(x-5)^2$