① $(x-y)^2 - (x+y)^2$

$(x-y).(x-y) - (x+y).(x+y)$

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

$x^2 - x^2 - 2xy - 2xy + y^2 - y^2$

$\boxed{-4xy}$

② a) $\frac{a^2 + (b+a).(b-a) + ab}{2a + 2a} \to \frac{a^2 + b^2 - a^2 + ab}{2(b+a)} \to \frac{b.(b+a)}{2(b+a)} \to \boxed{\frac{b}{2}}$

b) $\frac{(a-b)^2 - b^2}{a(a-4) - 4(b^2 - a)} \to \frac{(a-b-b).(a-b+b)}{a^2 - 4a - 4b^2 + 4a} \to \frac{(a-2b)a}{(a-2b).(a+2b)} \to \boxed{\frac{a}{a+2b}}$

③ $\frac{(4x^3 - x)}{2x+1} \to \frac{x(4x^2 - 1)}{2x+1} \to \frac{x(2x-1)(2x+1)}{2x+1} \to x(2x-1) \to \boxed{2x^2 - x}$

④ $x + y = 13 \;/\; xy = 1$

$x^2 + y^2 = 13^2 \to (x+y)^2 = 13^2 \to x^2 + 2xy + y^2 = 169 \to x^2 + y^2 = \boxed{167}$

⑤

Terreno 1 = $a \times a = a^2$

Terreno 2 = $b \times b = b^2$

$a^2 - b^2 \to \boxed{(a+b)(a-b)}$

⑥ a) $8a^3 + y^3$

$2^3 a^3 + y^3$

$(2a)^3 + y^3$

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

$\boxed{(2a+y)(4a^2 - 2ay + y^2)}$

b) $a^3 - 1000$

$a^3 - 10^3$

$(a-10)(a^2 + 10a + 10^2)$

$\boxed{(a-10)(a^2 + 10a + 100)}$

c) $27x^3 - 8$

$3^3 x^3 - 2^3$

$(3x)^3 - 2^3$

$(3x-2)((3x)^2 + 3x.2 + 2^2)$

$\boxed{(3x-2)(9x^2 + 6x + 4)}$

d) $x^3 - \frac{1}{8}$

$\frac{1}{8}.(8x^3 - 1)$

$\boxed{\frac{1}{8}.(2x-1)(4x^2 + 2x + 1)}$

e) $8x^3 + 27$

$2^3 x^3 + 3^3$

$(2x)^3 + 3^3$

$(2x+3)((2x)^2 - 2x.3 + 3^2)$

$\boxed{(2x+3)(4x^2 - 6x + 9)}$

⑦ a) $a^3 - ab^2$

$a(a^2 - b^2)$

$\boxed{a(a-b)(a+b)}$

b) $12a^3 - 3ab^2$

$3a(4a^2 - b^2)$

$\boxed{3a(2a-b)(2a+b)}$

c) $x^2 y - y^3$

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

$\boxed{y(x-y)(x+y)}$

d) $2x^3 + 2x^2 + 2x$

$\boxed{2x(x^2 + x + 1)}$

e) $3x^2 - 3x - 36$

$3(x^2 - x - 12)$

$3(x^2 + 3x - 4x - 12)$

$3(x(x+3) - 4(x+3))$

$\boxed{3(x+3)(x-4)}$

(8) a) $(a+b+c)^2 - (a^2+b^2+c^2)$

$a^2+b^2+c^2+2ab+2ac+2bc-a^2-b^2-c^2$

$2ab+2ac+2bc$

b) $(a+b)^2-(b+c)^2-(a+c)\cdot(a-c)$

$a^2+2ab+b^2-(b^2+2bc+c^2)-(a^2-c^2)$

$a^2+2ab+b^2-(b^2+2bc+c^2)-a^2+c^2$

$2ab+b^2-b^2-2bc-c^2+c^2$

$2ab-2bc$

(10) a) $x^2+5x+4=0$

$\Delta = b^2-4ac$

$= 5^2-4.1.4$

$= 25-16=9$

$x = \frac{-b\pm\sqrt{\Delta}}{2a} \Rightarrow \frac{-5\pm3}{2} \Rightarrow x' = \frac{-5+3}{2} = -1$

$x'' = \frac{-5-3}{2} = -4$

$S=[-1,-4]$

b) $8x^2-28x+20=0 \quad (:4)$

$2x^2-7x+5=0$

$\Delta = b^2-4ac$

$=(-7)^2-4.2.5$

$=49-40=9$

$x = \frac{-b\pm\sqrt{\Delta}}{2a} \Rightarrow \frac{7\pm3}{4}$

$x' = \frac{7+3}{4} = \frac{5}{2}$

$x'' = \frac{7-3}{4} = 1$

$S=[5/2, 1]$

c) $\frac{1}{4x^2}+\frac{1}{3x^2}+\frac{1}{2}=0$

$\frac{3+4x+6x^2}{12x^2}=0$

$3+4x+6x^2=0$

$\Delta = b^2-4ac$

$= 4^2-4.6.3$

$= 16-72$

$= -52$

$S=[\emptyset]$