Teil 1

a) $(-3)(a+c)^2 = (-3)\cdot(a^2+2ac+c^2) = -3a^2-6ac-3c^2$

b) $(6x-10z)(-2x)^2 = (6x-10z)\cdot 4x^2 = 24x^3-40x^2z$

c) $3(9a^2+2b^2)+2(a-b)-3(2a-3b)$

$= 27a^2+6b^2+2a-2b-6a+9b$

$= 27a^2+6b^2-4a+7b$

d) $(-3a)(5a+2c)+4(3a+c)^2$

$= -15a-6ac+4\cdot(9a^2-6ac+c^2)$

$= -15a-6ac+36a^2-24ac+4c^2$

$= 36a^2-15a-30ac+4c^2$

Teil 2

a) $16a^2+20ab = 4a\cdot 4a+4a\cdot 5b = 4a(4a+5b)$

b) $ab+ab^2+a^2b = ab\cdot 1+ab\cdot b+ab\cdot a = ab(1+b+a)$

c) $12x^2-12y^2 = 12(x^2-y^2) = 12(x-y)(x+y)$

d) $3a^2+6a+3 = 3\cdot a^2+3\cdot 2a+3\cdot 1 = 3(a^2+2a+1)$

$= 3(a+1)^2$

Teil 3

a) $x - 10 = 4x + 20 \quad | -x \; ; -20$

$-30 = 3x \quad | : 3$

$-10 = x$

b) $-(5x - 3) = -(-x + 1) \quad | \cdot (-1)$

$5x - 3 = -x + 1 \quad | +x \; ; +3$

$6x = 4 \quad | : 6$

$x = \frac{4}{6} = \frac{2}{3}$

c) $\frac{1}{2}(x - 1) = \frac{1}{4}(2x + 12) \quad | \cdot 4$

$2(x - 1) = (2x + 12)$

$2x - 2 = 2x + 12 \quad | -2x \; ; +2$

$0 = 14 \quad \downarrow$ Keine Lösung

Teil 4

a) $(x + 1)^2 = x^2 + 10$

$x^2 + 2x + 1 = x^2 + 10 \quad | -x^2 \; ; -1$

$2x = 9 \quad | : 2$

$x = \frac{9}{2}$

b) $(2x-5)^2 = 4x^2 - 20$

$4x^2 - 20x + 25 = 4x^2 - 20 \quad | -4x^2 ; +20x ; +20$

$45 = 20x \quad | : 20$

$\frac{9}{4} = \frac{45}{20} = x$

c) $(\frac{1}{2}x + 2)^2 = \frac{1}{4}x^2 + 16$

$\frac{1}{4}x^2 + 2x + 4 = \frac{1}{4}x^2 + 16 \quad | -\frac{1}{4}x^2 ; -4$

$2x = 12 \quad | : 2$

$x = 6$

d) $(3x-6)^2 + x^2 = 5x^2 + 2 + 5x^2$

$9x^2 - 36x + 36 + x^2 = 10x^2 + 2$

$10x^2 - 36x + 36 = 10x^2 + 2 \quad | -10x^2 ; -2 ; +36x$

$34 = 36x \quad | : 36$

$\frac{17}{18} = x$

Teil 5

a) $\frac{1}{3}y - 5 = -\frac{1}{3}y + 3 \quad | + \frac{1}{3}y ; +5$

$\frac{2}{3}y = 8 \quad | \cdot \frac{3}{2}$

$y = 12$

b) $12 + 5 = 3(z - 8)$

$17 = 3z - 24 \quad | + 24$

$41 = 3z \quad | : 3$

$\frac{41}{3} = z$

c) $\frac{2}{5} + (-\frac{1}{5}z) + \frac{3}{5} = 9$

$-\frac{1}{5}z + \frac{5}{5} = 9 \quad | - 1$

$-\frac{1}{5}z = 8 \quad | \cdot (-5)$

$z = 40$

d) $3x - (-2x + 15) = -35x$

$3x + 2x - 15 = -35x$

$5x - 15 = -35x \quad | + 35x \; ; + 15$

$40x = 15 \quad | : 40$

$x = \frac{15}{40} = \frac{3}{8}$