227 a) $a(x+y) + 2x + 2y = a(x+y) + 2(x+y) = (x+y)(a+2)$

227 b) $bq + cq - (b+c)r = q(b+c) - (b+c)r = (b+c)(q-r)$

228 a) $a(3a-2b) + 9ac - 6bc = a(3a-2b) + 3c(a-2b)$
$$= (3a-2b)(a+3c)$$

228 b) $4m(p+q) - p - q = 4m(p+q) - 1(p+q) = (p+q)(4m-1)$

229 a) $au + av + bu + bv = a(u+v) + b(u+v) = (a+b)(u+v)$

229 b) $j^2 - jk + 2j - 2k = j(j-k) + 2(j-k) = (j-k)(j+2)$

230 a) $81ab + 72ad + 36bc + 32cd = 9a(9b+8d) + 4c(9b+8d)$
$$= (9b+8d)(9a+4c)$$

230 b) $mn - m + n - 1 = m(n-1) + 1(n-1) = (n-1)(m+1)$

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

237 b) $4c^2 - 9d^2 = (2c+3d)(2c-3d)$

237 c) $z^2 - 225 = (z+15)(z-15)$

237 d) $36n^2 - 1 = (6n-1)(6n+1)$

238 a) $16m^2 - 9n^2 = (4m+3n)(4m-3n)$

238 b) $25x^2 - 1 = (5x+1)(5x-1)$

238 c) $-4s^2 + 49t^2 = 49t^2 - 4s^2 = (7t+2s)(7t-2s)$

238 d) $121q^2 - 576 = (11q+24)(11q-24)$

239 a) $6a^2 - 6b^2 = 6(a^2-b^2) = 6(a+b)(a-b)$

239 b) $9k^4 - 36k^2 = 9k^2(k^2-4) = 9k^2(k+2)(k-2)$

240 a) $18z^2 - 2 = 2(9z^2-1) = 2(3z+1)(3z-1)$

240 b) $75r^2 - 147 = 3(25r^2-49) = 3(5r+7)(5r-7)$

241 a) $a(x^2 - x^2) + b(x^2 - y^2) = (a+b)(x^2-y^2)$
$$= (a+b)(x+y)(x-y)$$

241 b) $p^2u + 2p^2v - 4u - 8v = p^2(u+2v) - 4(u+2v)$
$$= (u+2v)(p^2-4)$$
$$= (u+2v)(p+2)(p-2)$$

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

243 b) $36u^2 + 60uv + 25v^2 = (6u+5v)^2$

243 c) $n^2 - 4n + 4 = (n - 2)^2$

243 d) $4c^2 + 28cd + 49d^2 = (2c + 7d)^2$

243 e) $9q^2 - 6q + 1 = (3q - 1)^2$

243 f) $a^4 - 2a^2b^2 + b^4 = (a^2 - b^2)^2$
$$= \left((a + b)(a - b)\right)^2$$
$$= (a + b)^2(a - b)^2$$

244 a) $m^2 - 2m + 1 = (m - 1)^2$

244 b) $4f^2 - 20fg + 25g^2 = (2f - 5g)^2$

244 c) $x^2 + 16x + 64 = (x + 8)^2$

244 d) $16r^2 - 24rs + 9s^2 = (4r - 3s)^2$

244 e) $p^4 - 8p^2 + 16 = ((p + 2)(p - 2))^2$
$$= (p + 2)^2(p - 2)^2$$

244 f) $36z + 81z^2 + 4 = 81z^2 + 36z + 4$
$$= (9z + 2)^2$$

245 a) $5a^2 - 10ab + 5b^2 = 5(a^2 - 2ab + b^2)$
$$= 5(a - b)^2$$

245 b) $xy^2 + 2xy + x = x(y^2 + 2y + 1)$
$$= x(y + 1)^2$$

245 c) $-3u^2 + 18uv - 27v^2 = (-3)(u^2 - 6uv + 9v^2) = -3(u - 3v)^2$

249 a) $x^2 + 9x + 20 = (x + 4)(x + 5)$

249 b) $d^2 + 20d + 91 = (d + 7)(d + 13)$

249 c) $r^2 - 15r + 54 = (r - 6)(r - 9)$

250 a) $s^2 + 18s + 72 = (s + 6)(s + 12)$

250 b) $z^2 - 19z + 48 = (z - 3)(z - 16)$

250 c) $p^2 + 23p + 132 = (p + 11)(p + 12)$

251 a) $a^2 + 2a - 24 = (a - 4)(a + 6)$

251 b) $u^2 - 3u - 40 = (u - 8)(u + 5)$

251 c) $u^2 - 3u - 40 = (u - 8)(u + 5)$

252 a) $c^2 - 3c - 108 = (c - 12)(c + 9)$

252 b) $m^2 + 4m - 5 = (m + 5)(m - 1)$

252 c) $y^2 - y - 30 = (y + 5)(y - 6)$

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253 a) $\ b^2 + 20b + 51 = (b+17)(b+3)$

253 b) $\ t^2 + t - 156 = (t-12)(t+13)$

253 c) $\ x^2 - 4x + 16$ ist unzerlegbar

254 a) $\ m^2 - m - 110 = (m+10)(m-11)$

254 b) $\ z^2 - 29z + 208 = (z-16)(z-13)$

254 c) $\ q^2 - 16q - 36 = (q-18)(q+2)$

255 a) $\ 5x^2 + 10x - 75 = 5(x^2 + 2x - 15)$
$$= 5(x+5)(x-3)$$

255 b) $\ n^3 - n^2 - n = n(n^2 - n - 1)$

255 c) $\ -4t^2 - 4t + 48 = -4(t^2 + t - 12)$
$$= -4(t-3)(t+4)$$

256 a) $\ 9z^4 - 36z^3 + 27z^2 = 9z^2(z^2 - 4z + 3)$
$$= 9z^2(z-1)(z-3)$$

256 b) $\ -3k^2 - 3k - 60 = -3(k^2 + k + 20) \quad$ fertig

256 c) $\ 2b^5 + 9b^4 - 5b^3 = b^3(2b^2 + 9b - 5)$
$$= b^3(2b-1)(b+5)$$