

Advanced Factoring Solutions.

① $(a^2+2a)^2 - 2(a^2+2a) - 3$

This is an expression which is quadratic in nature

A good way to see this is to

let $a^2+2a = x$

then we have $x^2 - 2x - 3 = (x-3)(x+1)$

then we come back to what x stands for:

$$((a^2+2a)-3)((a^2+2a)+1) = (a^2+2a-3)(a^2+2a+1) = (a+1)^2(a^2+2a-3)$$

This way we have represented the original expression as a product which means we factored it.

② $(y^2-2y)^2 - 11(y^2-2y) + 24$

let $y^2-2y = z$

then $z^2 - 11z + 24 = (z-8)(z-3)$

and $(y^2-2y)^2 - 11(y^2-2y) + 24 = ((y^2-2y)-8)((y^2-2y)-3)$
 $= (y^2-2y-8)(y^2-2y-3) = (y-3)(y+1)(y-4)(y+2)$

③ $(a-1)^2 + 2(a^2+4a-5)$

$$= (a-1)^2 + 2(a+5)(a-1) = (a-1)[(a-1) + 2(a+5)]$$

$$= (a-1)(a-1+2a+10) = (a-1)(3a+9) = 3(a-1)(a+3)$$

④ $(2x+y)^2 + 3(6x^2-xy-2y^2) = (2x+y)^2 + 3(6x^2-4xy+3xy-2y^2)$

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

$$= (2x+y)[(2x+y) + 3(3x-2y)] = (2x+y)[2x+y+9x-6y] = (2x+y)[11x-5y]$$

⑤ $15(7m)^2 - 14(7m) - 8$

$$= 15(7m)^2 - 20(7m) + 6(7m) - 8 = 5(7m)[3(7m)-4] + 2[3(7m)-4]$$

$$= [3(7m)-4][5(7m)+2] = [21m-4][35m+2]$$