

$$(e) 11x^2 + 4xy + y^2 - 4y + 1$$

$$11x^2 + 4xy + \frac{1}{2}y^2 + \frac{1}{2}y^2 - 4y + 1$$

$$= 11x^2 + \frac{1}{2}(8xy + y^2) + \frac{1}{2}(y^2 - 8y) + 1$$

$$= 3x^2 + \frac{1}{2}(16x^2 + 8xy + y^2) + \frac{1}{2}(y^2 - 8y - 16)$$

$$+ 8 + 1$$

$$= 3x^2 + \frac{1}{2}(4x + y)^2 + \frac{1}{2}(y - 4)^2 + 9$$

$$\geq 9$$