Simplify the following expressions, writing them as polynomoials in standard form. (Show at least one intermediate step for each.)

1 $(x+5)(x+7)$

Multiply each term in the left factor by each term in the right one; combine like terms.

$$(x+5)(x+7) = (x)(x) + (x)(7) + (5)(x) + (5)(7) = x^2 + 7x + 5x + 35 = x^2 + 12x + 35.$$

2 $(2y^2 - 6y + 1)(y - 3)$

This is like the last one, just with more terms.

$$\begin{aligned}(2y^2 - 6y + 1)(y - 3) &= (2y^2)(y) + (2y^2)(-3) + (-6y)(y) + (-6y)(-3) + (1)(y) + (1)(-3) \\ &= 2y^3 - 6y^2 - 6y^2 + 18y + y - 3 = 2y^3 - 12y^2 + 19y - 3.\end{aligned}$$

3 $3a(a+4)^2$

Do exponentiation first.

$$3a(a+4)^2 = 3a[(a+4)(a+4)] = 3a[a^2 + 4a + 4a + 16] = 3a[a^2 + 8a + 16] = 3a^3 + 24a^2 + 48a.$$