Section 4.5: Multiplication: Special Cases

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two multiplication patterns:

$$(A+B)(A-B) = A^2 - AB + AB - B^2$$

$$= A^2 - B^2$$

shortcut

called a "difference of squares"

examples:

a) $(x+2)(x-2)$

$x^2 - 4$

b) $(y+z)(y-z)$

$y^2 - z^2$

c) $(x-2)(x+2)$

$x^2 - 4$

note that the order of the sum $x+2$ and difference $x-2$ doesn't matter

d) $(2x+3)(2x-3)$

$4x^2 - 9$

e) $(5a - 2b)(5a + 2b)$

$25a^2 - 4b^2$

second pattern:

$(A+B)^2 = (A+B)(A+B) = A^2 + AB + AB + B^2$

$= A^2 + 2AB + B^2$

shortcut

examples: multiply out and simplify when possible

a) $(2m - 7)^2$

$= (2m)^2 + 2(2m)(-7) + (-7)^2$

$= 4m^2 - 28m + 49$

b) $(x + 5)^2$

$= x^2 + 2(x)(5) + 5^2$

$= x^2 + 10x + 25$

c) $(6-n)^2$

$= 36 + 2(6)(-n) + (-n)^2$

$= 36 - 12n + n^2$

extra practice:

$(a+b)(a^2-ab+b^2)$

$= a^3 - a^2b + ab^2 + a^2b - ab^2 + b^3$

$= a^3 + b^3$