MATH 6: HANDOUT 24
FACTORIZATION AND SYSTEMS OF LINEAR EQUATIONS

1. Factorization

When handling with large algebraic expressions, it is often possible to simplify them. One of of doing this is by **factorization**. As its name suggests, this method consists of finding a common factor in two or more terms. For example, in the following expression

$$7x + 9x - 5x$$

the three terms share the common factor x. Therefore, we can rewrite this expression as:

$$7x + 9x - 5x = (7 + 9 - 5)x = 11x.$$

In general, we will have the following identities:

$$(a+b)^2 = a^2 + 2ab + b^2$$
$$(a-b)^2 = a^2 - 2ab + b^2$$
$$(a+b)(a-b) = a^2 - b^2$$
$$ab + ac = a(b+c)$$

Homework

1. Factor:
a. $6a + 12 =$
b. $mn + n =$
c. $5xy - 15x$=
d. $4ax - 8ax^2 + 12ax^3 =$

2. Factor using the factorization identities we learned above:
a. $9 - x^2 =$
b. $x^6 - 4 =$
c. $9 - 6x + x^2 =$
d. $a^3 - 2a^2x + ax^2 =$

3. Show that the left hand side (LHS) = right hand side (RHS):
a. $(m-n)(a+b) + m - n = a(m-n) + (b+1)(m-n)$
b. $x^2(x+1) - x - 1 = x(x+1)^2 - (x+1)^2$
c. $2x(x+b) + a(x+b) = (2x+a)x + (2x+a)b$
d. $(a+b)^2 + c(a+b) = (a+b)(a+c) + (a+b)b$