

Factored Forms

- The same algebraic expression can be written in various forms

$$a(b+c) = ab+ac$$

$$2l+2w = 2(l+w)$$

$$(x+2)(x+4) = x^2 + 6x + 8 \quad (\text{FOIL})$$

Ex) Show that $\frac{1}{2}(6x + \frac{5}{3}) - \frac{1}{3}(6x + \frac{5}{2}) = x$ is an identity.

* We are not solving, instead we need to "prove" the left side is the same as the right

$$\frac{1}{2}(6x + \frac{5}{3}) - \frac{1}{3}(6x + \frac{5}{2}) = x \quad \text{Given.}$$

$$3x + \frac{5}{6} - 2x - \frac{5}{6} = x \quad \text{D.A.}$$

$$x = x \quad \text{C.L.T.}$$

* If we tried to solve this equation we would get $0=0$. This means any value of x would satisfy the equation.

Factors

$$5(2x-3) = 10x - 15$$

This identity shows that 5 multiplied by $2x-3$ is the same as $10x-15$, we can say 5 and $2x-3$ are factors of $10x-15$.

- If an expression can not be written as a product of expressions then it is said to be prime

monomial - contains one term

ex) $5a^2b$ factors are 5, a, a, b

Binomial - contains two terms

ex) x^2-4 factors are $(x-2)(x+2)$

Trinomial - contains three terms

e) x^2+3x+2 factors are $(x+2)(x+1)$

polynomial - a general term for an expression with multiple terms.

The Common Factor

$$\blacktriangleright a(b+c+d+\dots) = ab+ac+ad+\dots$$

$$\blacktriangleright ab+ac+ad+\dots = a(b+c+d+\dots)$$

Ex) factor out the common term $12x^2-3x$ if possible.

$$3 \cdot 2 \cdot 2 \cdot x \cdot x - 3x$$

$$(3x)(4x) - 3x$$

$$3x(4x-1)$$

Ex) If possible, factor out the common term from $6x^2 + 1$

$$6x^2 + 1$$
$$3 \cdot 2 \cdot x \cdot x + 1$$

no common term

Ex) Factor $ab + ac - 2b - 2c$, if possible

$$\textcircled{a} \cdot b + \textcircled{a} \cdot c + \underline{-2} \cdot b + \underline{-2} \cdot c$$

$$\frac{a(b+c) - 2(b+c)}{(b+c)(a-2)}$$

Ex) Factor $x^3 - 2x^2 + x - 2$

$$x^2(x-2) + x-2$$
$$(x-2)(x^2+1)$$

Ex) Factor $2x^3 - 3x^2 - 8x + 12$

$$x^2(2x-3) - 4(2x-3)$$
$$(2x-3)(x^2-4)$$

(Goal) have a list of products that when multiplied together get the original expression