

03 The Division Algorithm

and Applications

Do you know what the word Algorithm means??

What you know...

- Addition ○ $f(x) + g(x)$
- Subtraction ○ $f(x) - g(x)$
- Multiplication ○ $f(x)g(x)$

a Review of Long division

$$\begin{array}{r} 2012.3 \\ 12 \overline{) 24148.0} \\ \underline{-24} \\ 01 \\ \underline{-0} \\ 14 \\ \underline{-12} \\ 28 \\ \underline{-24} \\ 40 \\ \underline{-36} \\ 40 \\ \dots \end{array}$$

Now we move on to Polynomial Division

○ what do you know regarding $\frac{u(x)}{v(x)}$

or 1. $u(x) = w(x)v(x)$

2. $u(x) = 0 \& v(x) = 0$

If $u(x) = x^3 + x$ & $v(x) = x^2 + x + 1$

$$\frac{x^3 + x}{x^2 + x + 1} = w(x)$$

Previous Long Division

$$\begin{array}{r} \overline{x^3 + x} \\ x^2 + x + 1 \overline{) x^3 + x} \\ \underline{-x^3 - x^2 - x} \\ -x^2 + 0 \\ \underline{+x^2 + x + 1} \\ x + 1 \end{array}$$

-1 remainder



Lets take it back to the book defn

$$u(x) = w(x)v(x)$$

$$x^3 + x = w(x)(x^2 + x + 1)$$



Think about $w(x)$

$$u(x) = w(x)v(x)$$

$$x^3 + x = w(x)(x^2 + x + 1)$$

- o $w(x)$ must be degree of 1
- o because the product must be degree 3



$w(x)$ must be degree 1

- o What does degree 1 look like?
- o What type of equation is always degree 1?
- o Linear
- o What does a linear equation look like?
- o $ax+b$ this is degree 1
