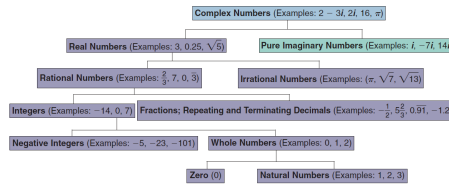


4.1/4.3 Polynomial functions/Synthetic Division



206 Chapter 4 Polynomial and Rational Functions

Degree of a term - For a term with one variable, the degree is the variable's exponent. With more than one variable, the degree is the sum of the exponents of the variables.

Term	Degree
$-5x^7$	7
$3x$	1
$9x^2y^4$	6
ab	2
12	0

Ex. $2x^3 + 4x^2 - 2x + 6$

Annotations: Degree 2 (pointing to $4x^2$), Degree 0 (pointing to 6), Degree 3 (circled, pointing to $2x^3$), Degree 1 (pointing to $-2x$).

Roots - Whenever $f(x) = 0$

Ex. $f(x) = 3x^4 - x^3 + x^2 + x - 1$; Is -2 a zero of $f(x)$?

$f(-2) = 3(-2)^4 - (-2)^3 + (-2)^2 + (-2) - 1$
 $= 57$ (NO)

Ex. $x^2 + x - 6 = 0$ How many complex roots? 2

$(x-2)(x+3) = 0$
 $x = 2$ $x = -3$

LT20: I can write an equation of a polynomial function given its complex roots (real and imaginary).

Ex. roots: $2, 3i, -3i$ $i^2 = -1$
 $i = \sqrt{-1}$

$(x-2)(x-3i)(x+3i)$
 $(x-2)(x^2 - 9i^2)$
 $(x-2)(x^2 + 9)$
 $x^3 + 9x - 2x^2 - 18$
 $x^3 - 2x^2 + 9x - 18 = 0$

LT21: I can find all the roots of a polynomial using factoring, synthetic division, and/or Quadratic Formula.

#15

$x^2 - 6x + 9 = \frac{1}{x-3}$

$x-3 \overline{) x^3 - 9x^2 + 27x - 28}$
 $-x^3 + 3x^2$
 $\underline{-6x^2 + 27x}$
 $-6x^2 + 18x$
 $\underline{9x - 28}$
 $-9x + 27$
 $\underline{-1}$

#17

$x^4 - 8x^2 + 16 \div x+2$

$1 \ 0 \ -8 \ 0 \ 16 \ \div \ x+2$
 $\downarrow \ \downarrow \ \downarrow \ \downarrow \ \downarrow$
 $1 \ 0 \ -8 \ 0 \ 16 \ -2$

$-2 \overline{) 1 \ 0 \ -8 \ 0 \ 16}$
 $\underline{+2 \ +4 \ +8 \ -16}$
 $1 \ -2 \ -4 \ 8 \ 0$

$x^3 - 2x^2 - 4x + 8$

#19 $x^3 - x + 6 \div x-2$

21

$1 \ 0 \ -1 \ 6$
 $\underline{+2 \ +4 \ 6}$
 $1 \ 2 \ 3 \ \vdots \ 12$
 $x^2 + 2x + 3 + \frac{12}{x-2}$