Algebra 2 5.7

Determine the number and type of roots for a polynomial equation

Find the zeros of a polynomial function

*Ch. 4

Write equations from given roots

Fundamental theorem of algebra (how many roots?)
Descarte's rule of signs (type of roots)
complex number*
conjugate pair*
coefficient
integer

Quiz 5.5-5.6

What are steps to solve a quadratic?

$$x^{2}-4x+3=0$$

$$(x-3)(x-1)=0$$

$$x^{2}-4x+3=0$$

$$(x-3)(x-1)=0$$

$$x^{2}-3x+10$$

$$x^{2}-7x+10=0$$

$$x^$$

Write equation with x=3 and x=-5 as roots (solutions)

$$\chi^{2}+2x-15=0$$
 $(x-3)(x+5)=0$
 $\chi^{-3}=0$
 $\chi^{-3}=0$

x=3i x=-3i

KeyConcept Complex Conjugates Theorem

Words Let a and b be real numbers, and $b \neq 0$. If a + bi is a zero of a polynomial function with

real coefficients, then a - bi is also a zero of the function.

If 3 + 4i is a zero of $f(x) = x^3 - 4x^2 + 13x + 50$, then 3 - 4i is also a zero of the Example

function.

$$\chi^{2} + 9 =$$

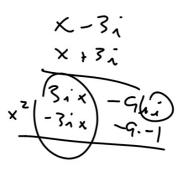
$$(\chi - 3i)(\chi + 3i) = 0$$

$$\chi - 3i = 0 \qquad \chi + 3i = 0$$

$$\chi = 3i \qquad \chi = -3i$$

$$-3i = 3i \qquad \chi = -3i$$

$$+3i + 3i$$



$$x^{2}-7\times+10=0$$

 $(x-5)(x-2)=0$
 $(x-5)=0$ $(x-2)=0$
 $X=S$ $x=2$

Write equations given roots...

Example 4 Use Zeros to Write a Polynomial Function



Write a polynomial function of least degree with integral coefficients, the zeros of which include -1 and 5 - i.

 $(\chi+1)(\chi^2-D\times+26)=0$

X+1=0 X-5+=0 X-5-==0

X2-10x+26

These are the solutions

(are they all there?)

What are the factors? How many factors? Equations must = something What is an integer?

x3-9x2+16x+26=0

- 1. answer
- 2. make factor
- 3. ewe 4. eg = 0

GuidedPractice

 Write a polynomial function of least degree with integral coefficients having zeros that include −1 and 1 + 2i.



2. State the possible number of positive real zeros, negative real zeros, and imaginary zeros of $h(x) = 2x^5 + x^4 + 3x^3 - 4x^2 + x + 9$.

6,5 P

WS Skills oak

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Q 0,2,4

Number of Positive Real Zeros Number of Negative Real Zeros Number of Imaginary Zeros Total Number of Zeros

ReviewVocabulary

complex conjugates two complex numbers of the form a + bi and a - bi

In Chapter 4, you learned that the product of complex conjugates is always a real number and that complex roots always come in conjugate pairs. For example, if one root of $x^2 - 8x + 52 = 0$ is 4 + 6i, then the other root is 4 - 6i.

This applies to the zeros of polynomial functions as well. For any polynomial function with real coefficients, if an imaginary number is a zero of that function, its conjugate is also a zero. This is called the **Complex Conjugates Theorem**.