

Spiral Review

Use DeCartes's Rule of Signs to determine types of zeros

a.) $5x^4 + 9x^3 - 19x^2 - 3x$

N Y N

1 (+) zero

$f(-x) = 5x^4 - 9x^3 - 19x^2 + 3x$

Y N Y

2 or 0 (-) zeros

b.) $z^4 - z^3 - 2z - 4$

Y N N

2 or 0 (+) zeros

$f(-x) = z^4 + z^3 + 2z - 4$

N N Y

2 or 0 (-) zeros

* skip a term, counts as a sign change!

p.135 2.5 The Fundamental Theorem of Algebra

- 1.) Use DeCartes's Rule of Sign to determine possible combinations of zeros.
- 2.) Find possible zeros
- 3.) Use synthetic division to show it is a real zero.
- 4.) Factor or use Quadratic Formula once you have a quadratic

**You may have to use graphing calculator to help find a real zero if it is a fraction.

Students will be able to find all the zeros of the function and write the polynomial as a product of linear factors.

Example 1: Find all the zeros of the function and write the polynomial as a product of linear factors.

a.) $f(x) = x^4 + 29x^2 + 100$

$$= (x^2 + 25)(x^2 + 4)$$

$$\begin{array}{r} x^2 + 25 = 0 \\ -25 \quad -25 \\ \hline \sqrt{x^2} = \sqrt{-25} \end{array}$$

$$x = \pm 5i$$

$$\begin{array}{r} x^2 + 4 = 0 \\ -4 \quad -4 \\ \hline \sqrt{x^2} = \sqrt{-4} \end{array}$$

$$x = \pm 2i$$

$$(x+5i)(x-5i)(x+2i)(x-2i)$$

4 zeros

$$f(x) = x^4 + 29x^2 + 100$$

N N *skipped x

2 or 0 (+) zeros

$$f(-x) = x^4 + 29x^2 + 100$$

N N

2 or 0 (-) zeros

+	-	i	0
2	2	0	x
2	0	2	x
0	2	2	x
*0	0	4	x

Students will be able to find all the zeros of the function and write the polynomial as a product of linear factors.

b.) $f(x) = 3x^3 - 2x^2 + 75x - 50$

$$\begin{array}{r} \frac{2}{3} \overline{) 3 \quad -2 \quad 75 \quad -50} \\ \underline{ 2 \quad 0 \quad 50} \\ 3 \quad 0 \quad 75 \quad 0 \quad \checkmark \end{array}$$

$$\begin{array}{r} 3x^2 + 75 = 0 \\ -75 \quad -75 \\ \hline 3x^2 = -75 \end{array}$$

$$\frac{3x^2}{3} = \frac{-75}{3}$$

$$\sqrt{x^2} = \sqrt{-25}$$

$$x = \pm 5i$$

$$(x+5i)(x-5i)(3x-2)$$

3 zeros

$$f(x) = 3x^3 - 2x^2 + 75x - 50$$

y y y

3 or 1 (+) zeros

$$f(-x) = -3x^3 - 2x^2 - 75x - 50$$

N N N

0 (-) zeros

+	-	i	0
3	0	0	x
*1	0	2	x

Students will be able to find all the zeros of the function and write the polynomial as a product of linear factors.

c.) $h(x) = x^4 + 6x^3 + 10x^2 + 6x + 9$

Students will be able to find all the zeros of the function, write the polynomial as a product of linear factors, and use your factorization to find x-intercepts.

Example 2: Find all the zeros, write the polynomial as a product of linear factors, and use your factorization to find x-intercepts. ← write as ordered pair (#,0)

$$f(x) = 2x^3 - 5x^2 + 18x - 45$$

$$\begin{array}{r|rrrr} \frac{5}{2} & 2 & -5 & 18 & -45 \\ & \downarrow & 5 & 0 & 45 \\ \hline & 2 & 0 & 18 & 0 \end{array} \checkmark$$

$$\begin{array}{r} 2x^2 + 18 = 0 \\ -18 \quad -18 \\ \hline 2x^2 = -18 \\ \frac{2}{2} \quad \frac{-18}{2} \\ x^2 = -9 \end{array}$$

$$\sqrt{x^2} = \sqrt{-9}$$

$$x = \pm 3i$$

$$(x+3i)(x-3i)(2x-5)$$

$$x\text{-int.: } \left(\frac{5}{2}, 0\right)$$

Turn-in:
p.140 (34, 42)

HW Assignment:
p.140 (27-43 odds)