Name:	Date:	Period:

6.8 Solving Polynomials with Real Complex Notes

Review Factor Practice h.o.
6.4 factor by grouping
6.5 solving by factoring
6.7 solving with div.

Irrational Zeros

1. $f(x) = 4x^4 - 33x^2 + 8$ factors

#9 6.4 Factoring Prac.

$(x^2)^2$

$32x^4$, $-32x^2$, $-1x^2$, $-33x^2$

$4x^4 - 32x^2 - 1x^2 + 8 = f(x)$

$4x^2(x^2-8) - 1(x^2-8) =$

$(4x^2-1)(x^2-8) =$

$(2x-1)(2x+1)(x^2-8) =$

$2x-1=0$ $\quad 2x=1$ $\quad x=1/2$

$2x+1=0$ $\quad 2x=-1$ $\quad x=-1/2$

$x^2-8=0$ $\quad x^2=8$ $\quad x=\pm\sqrt{8}=\pm 2\sqrt{2}$ solve for zeros

Zeros: $x = \pm\frac{1}{2}, \pm 2\sqrt{2}$

2. $f(x) = (x^3 - 2x^2) - (18x + 36)$ factors

$= x^2(x-2) - 18(x-2)$

$= (x^2-18)(x-2)$

= ☹ does not factor

$x^2-18=0$ $\quad x^2=18$ $\quad x=\pm\sqrt{18}=\pm 3\sqrt{2}$

$x-2=0$ $\quad x=2$

Zeros: $x = \{\pm 3\sqrt{2}, 2\}$

3. $f(x) = 2x^4 - 5x^3 - 4x^2 + 15x - 6;\ x = 2$

Does not factor

6.7 notes find zeros by div.

2	2	-5	-4	15	-6
		4	-2	-12	6
	2	-1	-6	3	0

$f(x) = (2x^3 - x^2 - 6x + 3)(x-2)$

factors: grouping

$(2x^3 - x^2) - (6x + 3)$

$x^2(2x-1) - 3(2x-1)$

$(x^2-3)(2x-1)$

$f(x) = (x^2-3)(2x-1)(x-2)$

$x^2-3=0$ $\quad x^2=3$ $\quad x=\pm\sqrt{3}$

$2x-1=0$ $\quad 2x=1$ $\quad x=\frac{1}{2}$

$x-2=0$ $\quad x=2$

Zeros

$x = \{\pm\sqrt{3}, \frac{1}{2}, 2\}$

Complex Zeros

The Fundamental Theorem of Algebra

A polynomial function of degree *n* has at least one zero in the complex system.

* Remember: Any real number is also a complex number

4. $f(x) = x^4 - 4x^2 - 12$

$(x^2)^2$

$f(x) = (x^2 - 6)(x^2 + 2)$ cannot factor

$x^2 - 6 = 0$ $\quad x^2 + 2 = 0$

$x^2 = 6$ $\quad x^2 = -2$

$x = \pm\sqrt{6}$ $\quad x = \pm i\sqrt{2}$

Two real (irrational) and two complex

5. $f(x) = 2x^5 - 5x^4 - 2x + 5$

$= x^4(2x - 5) - 1(2x - 5)$

$= (x^4 - 1)(2x - 5)$

$= (x^2 - 1)(x^2 + 1)(2x - 5)$

$= (x - 1)(x + 1)(x^2 + 1)(2x - 5)$ factored completely

$x^2 + 1 = 0$ $\quad 2x - 5 = 0$

$x^2 = -1$ $\quad 2x = 5$

$x = \pm i$ $\quad x = \frac{5}{2}$

or

$x^2 - 1 = 0$

$x^2 = 1$

Zeros: $x = \pm 1, \pm i, \frac{5}{2}$

6. $f(x) = x^5 - 3x^4 - x^3 + 3x^2 - 2x + 6;\ x = 3$

3 | 1 -3 -1 3 -2 6

3 0 -3 0 -6

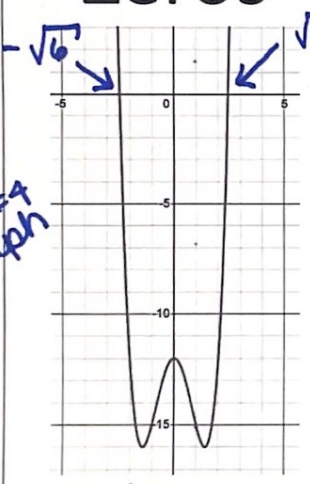
1 0 -1 0 -2 0

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

$f(x) = (x - 3)(x^2 - 2)(x^2 + 1)$

$x = 3$ $\quad x^2 = 2$ $\quad x = \pm\sqrt{2}$ $\quad x^2 + 1 = 0$ $\quad x^2 = -1$ $\quad x = \pm i$

Zeros $x = \{\pm\sqrt{2}, 3, \pm i\}$



#4 graph

Two complex (do not cross x axis)

6.2 Shapes and key features