grades
total points

- HW quizzes
- quizzes
- Tests
- project

No cell phones during instruction or classwork

Polynomials

August 22

Ex. Find the zeros.

$f(x) = x^3 + 4x^2 - 2x - 20 = 0$

synthetic substitution

$\pm 1, \pm 2, \pm 4, \pm 5, \pm 10, \pm 20$

1 | 1 4 −2 −20

	1	5	3
1	5	3	−17

$= f(1)$

−1 | 1 4 −2 −20

	−1	−3	5
1	3	−5	−15

$= f(-1)$

2) 1 4 −2 −20

2 12 20

1 6 10 | 0 = f(2)

$(x-2)(x^2+6x+10)=0$

$$x=\frac{-6\pm\sqrt{36-4(10)}}{2}$$

$\sqrt{-1}=i$

$$x=\frac{-6+\sqrt{-4}}{2}=\frac{-6\pm 2i}{2}$$

$x=-3\pm i$

$x=2$

$X_1 = 2$

$X_2 = -3 + i$

$X_3 = -3 - i$

$i^2 = -1$

$X_1 \cdot X_2 \cdot X_3 = 2(-3+i)(-3-i)$

$= 2(9 + 3i - 3i + 1)$

$= 2(10)$

$= 20$

$X_1 \cdot X_2 + X_1 \cdot X_3 + X_2 \cdot X_3$

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

$-6 + 2i \quad -6 - 2i + 10$

-2

$x_1 + x_2 + x_3 =$

$2 + (-3 + i) + (-3 - i) = -4$

$x^3 + 4x^2 - 2x - 20 = 0$

opposite of the sum of the zeros

same as the sum of the products of pairs

opposite of the sum of the triples

A quartic polynomial

Ex. 1 $x^4 - 5x^3 - 2x^2 + 46x - 60 = 0$

opp same opp same

2 | 1 −5 −2 46 −60

2 −6 −16 60

1 −3 −8 30 | 0

$(x-2)(x^3 - 3x^2 - 8x + 30) = 0$

−3 | 1 −3 −8 30

−3 18 −30

1 −6 10 | 0

$(x-2)(x+3)(x^2 - 6x + 10) = 0$

$\frac{6 \pm \sqrt{-4}}{2}$ $2i$

Zeros

$x_1 = 2$	$x_3 = 3 + i$
$x_2 = -3$	$x_4 = 3 - i$

products of pairs

$2 \cdot -3 = -6$

$2 \cdot (3+i) = 6 + 2i$

$2(3-i) = 6 - 2i$

$-3(3+i) = -9 - 3i$

$-3(3-i) = -9 + 3i$

$(3+i)(3-i) = 9 + 1 = 10$

-2

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

$-6(10)$

-60

Ex. $5x^3 - 4x^2 + 2x - 10 = 0$

Find $x_1 \cdot x_2 \cdot x_3 = \underline{+2}$

$$x^3 - \underbrace{\frac{4}{5}}_{\text{opp}} x^2 + \underbrace{\frac{2}{5}}_{\text{same}} x \underbrace{- 2}_{\text{opp}} = 0$$

Ex.