Algebra 2
Finding Zeros

Name: KEY
Date: _____ Period: _____

Given a polynomial and one of its factors, find the remaining factors of the polynomial.

1.) $x^3 - x^2 - 5x - 3;\ x + 1$

-1 | 1 −1 −5 −3
−1 2 3
1 −2 −3 0

$x^2 - 2x - 3$

$(x-3)(x+1)$

2.) $6x^3 - 25x^2 + 2x + 8;\ x - 4$

4 | 6 −25 2 8
↓ 24 −4 −8
6 −1 −2 0

$6x^2 - x - 2$

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

-12: -4, 6 and 3, -1

3.) $16x^5 - 32x^4 - 81x + 162;\ x - 2$

2 | 16 −32 0 0 −81 162
↓ 32 0 0 0 −162
16 0 0 0 −81 0

$16x^4 - 81$

$(4x^2 - 9)(4x^2 + 9)$

$(2x-3)(2x+3)(4x^2+9)$

4.) $x^4 + 2x^3 - 8x - 16;\ x + 2$

-2 | 1 2 0 −8 −16
↓ −2 0 0 16
1 0 0 −8 0

$x^3 - 8$

$(x-2)(x^2+2x+4)$

Find the value of k (algebraically) so that each remainder is 3.

5.) $(x^2 + kx - 17) \div (x - 2)$

2 | 1 k −17
↓ 2 2(k+2)
1 k+2 3

$2(k+2) - 17 = 3$
$2(k+2) = 20$
$k+2 = 10$
$k = 8$

6.) $(x^2 + 5x + 7) \div (x + k)$

$-k$ | 1 5 7
↓ −k k^2-5k
1 5−k 3

$k^2 - 5k + 7 = 3$
$k^2 - 5k + 4 = 0$
$(k-4)(k-1) = 0$

$k = 4$ $k = 1$

Given a function and one of its zeros, find all of the remaining zeros of the function.

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

2 | 1 -4 6 -4
↓ 2 -4 4
1 -2 2 0

$x^2 - 2x + 2 = 0$

$x = \frac{2 \pm \sqrt{4 - 4(1)(2)}}{2}$

$x = \frac{2 \pm \sqrt{4 - 8}}{2}$

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

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

$x = 1 \pm i$

8.) $f(x) = x^3 - 13x^2 + 55x - 91;\ zero: 7$

7 | 1 -13 55 -91
7 -42 91
1 -6 13 0

$x^2 - 6x + 13 = 0$

$x = \frac{6 \pm \sqrt{36 - 4(1)(13)}}{2}$

$x = \frac{6 \pm \sqrt{-16}}{2}$

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

$x = 3 \pm 2i$

State the number of possible zeros. Then find all of the zeros of each function.

9.) $f(x) = x^3 - 3x^2 - 10x + 24$

# of Zeros: 3

-3 | 1 -3 -10 24
↓ -3 +18 -24
1 -6 8 0

$x^2 - 6x + 8 = 0$

$(x - 4)(x - 2) = 0$

$x = 4 \quad x = 2$

Zeros: $-3, 2, 4$

10.) $f(x) = x^4 - 6x^2 + 12x - 8$

# of Zeros: 4

Zeros: $1.24, -3.24$

11.) $f(x) = x^3 - 7x^2 + 37x - 75$

# of Zeros: 3

3 | 1 -7 37 -75
↓ 3 -12 75
1 -4 25 0

$x^2 - 4x + 25 = 0$

$x = \frac{4 \pm \sqrt{16 - 4(1)(25)}}{2}$

$x = \frac{4 \pm \sqrt{16 - 100}}{2}$

$x = \frac{4 \pm \sqrt{-84}}{2}$

$x = \frac{4 \pm 2i\sqrt{21}}{2}$

$x = 2 \pm i\sqrt{21}$

Zeros: $3, 2 \pm i\sqrt{21}$

12.) $f(x) = 2x^5 - x^4 - 2x + 1$

# of Zeros: 5

-1 | 2 -1 0 0 -2 1
↓ -2 3 -3 +3 -1
2 -3 3 -3 +1 0

$2x^4 - 3x^3 + 3x^2 - 3x + 1 = 0$

1 | 2 -3 3 -3 1
↓ 2 -1 2 -1
2 -1 2 -1 0

$2x^3 - x^2 + 2x - 1 = 0$

$(2x^3 - x^2) + (2x - 1) = 0$

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

$(2x - 1)(x^2 + 1) = 0$

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

$x^2 + 1 = 0$
$x^2 = -1$
$x = \pm i$

Zeros: $-1, 1, 1/2, \pm i$