Factor f(x) into linear factors given that k is a zero of f(x).

5. $f(x) = 2x^3 - 3x^2 - 5x + 6; k = 1$

	x^3	x^2	x	c
1	2	-3	-5	6
	↓	2	-1	-6
	2	-1	-6	0

$(x-1)(2x^2 - x - 6)$

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

6. $f(x) = 6x^3 + 25x^2 + 3x - 4; k = -4$

	x^3	x^2	x	c
-4	6	25	3	-4
	↓	-24	-4	4
	6	1	-1	0

$(x+4)(6x^2 + x - 1)$

$(x+4)(3x-1)(2x+1)$

For the polynomial function, one zero is given. Determine all others.

7. $f(x) = x^3 - x^2 - 4x - 6; x = 3$

	x^3	x^2	x	c
3	1	-1	-4	-6
	↓	3	6	6
	1	2	2	0

Factors: $(x-3)(x^2 + 2x + 2)$

Zeros: $x = 3, -1 \pm i$

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

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

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

$= -1 \pm i$

Honors Algebra II/Trig
4.3 WS

Name: Key

For each polynomial function, **(a)** list all possible rational zeros, **(b)** determine all rational zeros, and **(c)** factor f(x).

1. $f(x) = x^3 + 3x^2 - 6x - 8$

(a) possible rational zeros: $\pm 1, 2, 4, 8$

(b) rational zeros: $x = -1, -4, 2$

(c) factor: $(x+1)(x+4)(x-2)$

	x^3	x^2	x	C
-1	1	3	-6	-8
	↓	-1	-2	8
	1	2	-8	0

$x^2 + 2x - 8$
$(x+4)(x-2)$

2. $f(x) = x^3 + 5x^2 + 2x - 8$

(a) possible rational zeros: $\pm 1, 2, 4, 8$

(b) rational zeros: $x = 1, -4, -2$

(c) factor: $(x-1)(x+4)(x+2)$

	x^3	x^2	x	C
1	1	5	2	-8
	↓	1	6	8
	1	6	8	0

$x^2 + 6x + 8$

3. $f(x) = x^3 + 9x^2 + 24x + 20$

(a) possible rational zeros: $\pm 1, 2, 4, 5, 10, 20$

(b) rational zeros: $x = -2, -5$

(c) factor: $(x+2)(x+5)(x+2)$

	x^3	x^2	x	C
-2	1	9	24	20
	↓	-2	-14	-20
	1	7	10	0

$x^2 + 7x + 10$

4. $f(x) = x^3 - 2x^2 - 14x + 3$

(a) possible rational zeros: $\pm 1, 3$

(b) rational zeros: $x = -3$

(c) factor: $(x+3)(x^2 - 5x + 1)$

	x^3	x^2	x	C
-3	1	-2	-14	3
	↓	-3	15	-3
	1	-5	1	0

$x^2 - 5x + 1$

other zeros are irrational