Fundamental Theorem of Alg. Practice

Name Key

Date _____ Per____

Find all the roots of each polynomial.

1. $x^3 - 11x^2 - 25x - 13 = 0$

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

3. $x^4 - 6x^2 + 8 = 0$

4. $x^4 - 16 = 0$

5. $x^4 - 2x^3 - 16x^2 + 32x = 0$

6. $x^4 + 29x^2 + 100 = 0$

① Possible zeros: $\frac{\pm 1, \pm 13}{\pm 1}$

$f(-1) = (-1)^3 - 11(-1)^2 - 25(-1) - 13$
$= -1 - 11 + 25 - 13 = 0$

-1	1	-11	-25	-13
		-1	12	13
	1	-12	-13	0

$x^2 - 12x - 13 = 0$
$(x - 13)(x + 1) = 0$
$x = 13$ $x = -1$

② Possible roots: ± 1

1	1	-1	1	-1
		1	0	1
	1	0	1	0

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

③ This can be factored
$(x^2 - 4)(x^2 - 2) = 0$

$x^2 - 4 = 0$ $x^2 - 2 = 0$
$x^2 = 4$ $x^2 = 2$
$x = \pm 2$ $x = \pm\sqrt{2}$

④ This can be factored
$(x^2 - 4)(x^2 + 4) = 0$

$x^2 - 4 = 0$ $x^2 + 4 = 0$
$x^2 = 4$ $x^2 = -4$
$x = \pm 2$ $x = \pm 2i$

⑤ Factor out x first
$x(x^3 - 2x^2 - 16x + 32) = 0$
$x = 0$

$x^3 - 2x^2 - 16x + 32 = 0$
$x^2(x - 2) - 16(x - 2) = 0$
$(x^2 - 16)(x - 2) = 0$

$x^2 - 16 = 0$ $x - 2 = 0$
$x = \pm 4$ $x = 2$

⑥ This can be factored
$(x^2 + 25)(x^2 + 4) = 0$

$x^2 + 25 = 0$ $x^2 + 4 = 0$
$x^2 = -25$ $x^2 = -4$
$x = \pm 5i$ $x = \pm 2i$