

Factoring and Expanding Roots of Polynomials Homework

Key

For #1-4, create a polynomial from the following roots (don't forget your conjugates!)

1.) 0, 2, 5

$$X(X-2)(X-5)$$

$$X(X^2-7X+10)$$

$$\boxed{X^3-7X^2+10X}$$

2.) $\pm 1, \pm \sqrt{2}$

$$(X-1)(X+1)(X-\sqrt{2})(X+\sqrt{2})$$

$$(X^2-1)(X^2-2)$$

$$\boxed{X^4-3X^2+2}$$

3.) -2, 3, $3i$, $-3i$

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

$$(X^2-X-6)(X^2+9)$$

$$X^4+9X^2-X^3-9X-6X^2-54$$

$$\boxed{X^4-X^3+3X^2-9X-54}$$

4.) -4, $1+2i$, $1-2i$

$$(X+4)(X-1+2i)(X-1-2i)$$

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

$$X^3-2X^2+4X+4X^2-8X+16$$

$$\boxed{X^3+2X^2-4X+16}$$

	X	-1	-2i
X	X ²	-X	-2iX
-1	-X	1	2i
2i	2iX	-2i	-4i ² (4)

For #5-6, factor the following polynomials

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

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

$$\boxed{(X^2-3)(X-1)}$$

6.) $f(x) = x^5 + 15x^3 - 16x$

$$X(X^4 + 15X^2 - 16)$$

Treat it like a quadratic

$$\boxed{X(X^2+16)(X^2-1)}$$

$$\boxed{X(X^2+16)(X+1)(X-1)}$$

* Final Answer *

For #7-8, solve each polynomial by factoring

7.) $f(x) = x^4 - 81$

$$(X^2-9)(X^2+9) = 0$$

$$X^2-9=0 \quad X^2+9=0$$

$$\sqrt{X^2} = \sqrt{9} \quad \sqrt{X^2} = \sqrt{9}$$

$$\boxed{X = \pm 3, \pm 3i}$$

8.) $f(x) = x^4 - x^3 + 25x^2 - 25x$

$$X(X^3 - X^2 + 25X - 25) = 0$$

$$X^2(X-1) \mid 25(X-1)$$

$$X(X^2+25)(X-1) = 0$$

$$X=0 \quad X^2+25=0 \quad X-1=0$$

$$\sqrt{X^2} = \sqrt{25} \quad X=1$$

$$\boxed{X = 0, \pm 5i, 1}$$