Day 64

6.6 Fundamental Thm. of Algebra

p. 341

1. $x^4 - 5x^2 + 4 = 0$

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

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

linear factors

a) $2, -2, 1, -1$

b.) real

c.) 4

2. $x^4 + 7x^2 + 12 = 0$

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

a) $2i, -2i, i\sqrt{3}, -i\sqrt{3}$

b.) imaginary

c.) 4

$x^2+4=0$ $\quad$ $x^2+3=0$

$-4\ -4$ $\quad$ $-3\ -3$

$\sqrt{x^2} = \sqrt{-4}$ $\quad$ $\sqrt{x^2} = \sqrt{3}$

$x = \pm 2i$ $\quad$ $x = \pm i\sqrt{3}$

3. Degree 4 = 4 solutions regardless of if they are Real or Imaginary.

(ex) State the # of complex roots, the # of possible real, and possible rational

complex roots = degree of function

$x^3+4x^2+5x-1=0$

3 complex roots

1 or 3 real

rational $\frac{\pm 1}{\pm 1} = \pm 1$ (2 rational roots)

(2) $3x^2-7=0$

complex roots = 2

real : 0, 2.

rational $\pm\left(\frac{1,7}{1,3}\right) = \pm 1, \pm\frac{1}{3}, \pm 7, \pm\frac{7}{3}$

8 possible rational

(3) Find the zeros.

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

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

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

$x-3=0$

$x=3$

$x^2+1=0$

$-1 \quad -1$

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

$$\begin{array}{r|rrrr} 3 & 1 & -3 & 1 & -3 \\ & & 3 & 0 & 3 \\ \hline & 1 & 0 & 1 & 0 \end{array}$$

$x = 3, i, -i$

$1x^2 + 1 = 0$

$-1 \quad -1$

$\sqrt{x^2} = \sqrt{-1}$

$x = \pm i$

p. 343 (3 – 6, 12 – 14, 16, 21, 22)