day 2

Chapter 2A

Learning Target 4

I can solve polynomials using
synthetic division

with imaginary solutions

Write the following in factored form then list the zeros.

1.) $f(x) = 3x^4 + 5x^3 + 10x^2 + 20x - 8$

$$\begin{array}{c|ccccc} -2 & 3 & 5 & 10 & 20 & -8 \\ & & -6 & 2 & -24 & 8 \\ \hline & 3 & -1 & 12 & -4 & 0 \end{array}$$

$(3x^3 - x^2) + (12x - 4) = 0$

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

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

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

$\sqrt{x^2} = \sqrt{-4} \qquad 3x = 1$

$x = \pm 2i \qquad x = 1/3$

Factored Form: $f(x) = (x+2)(x^2+4)(3x-1)$

Zeros: $x = -2, 1/3, 2i, -2i$

2.) $f(x) = x^5 - 4x^4 - 4x^3 + 16x^2 - 45x + 180$

$$\begin{array}{r|rrrrrr} -3 & 1 & -4 & -4 & 16 & -45 & 180 \\ & \downarrow & -3 & 21 & -51 & 105 & -180 \\ \hline & 1 & -7 & 17 & -35 & 60 & 0 \end{array}$$

Factored Form: $f(x) = (x+3)(x-3)(x-4)(x^2+5)$

$x^4 - 7x^3 + 17x^2 - 35x + 60 = 0$　Zeros: $x = -3, 3, 4, i\sqrt{5}, -i\sqrt{5}$

$$\begin{array}{r|rrrrr} 4 & 1 & -7 & 17 & -35 & 60 \\ & \downarrow & 4 & -12 & 20 & -60 \\ \hline & 1 & -3 & 5 & -15 & \boxed{0} \end{array}$$

$(x^3 - 3x^2) + (5x - 15) = 0$

$x^2(x-3) + 5(x-3) = 0$

$(x^2 + 5)(x-3) = 0$

$\sqrt{x^2} = \sqrt{-5}$　　　$x = 3$

$x = \pm i\sqrt{5}$