

Section 6.6 Fundamental Thm of Algebra

Creating the EQ w/ roots:

ex: $x=1, x=-1, x=2$

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

$$y = (x^2-1)(x-2)$$

$$y = x^3 - 2x^2 - x + 2$$

ex: $x = 2 \pm i, x = \pm\sqrt{3}, x = 1$

$$x-2 = \pm i \quad x^2 = 3 \quad x-1 = 0$$

$$(x-2)^2 = (\pm i)^2 \quad x^2 - 3 = 0$$

$$x^2 - 4x + 4 = i^2$$

$$x^2 - 4x + 4 = -1$$

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

ex: $x = 3 \pm \sqrt{7}$

$$x-3 = \pm\sqrt{7}$$

$$(x-3)^2 = (\pm\sqrt{7})^2$$

$$x^2 - 6x + 9 = 7$$

$$x^2 - 6x - 2 = 0$$

$$y = (x-1)(x^2-3)(x^2-4x+5)$$

$$y = (x^3-3x-x^2+3)(x^2-4x+5)$$

$$y = (x^3-x^2-3x+3)(x^2-4x+5)$$

$$y = x^5 - 4x^4 + 5x^3 - x^4 + 4x^3 - 5x^2 - 3x^3 + 12x^2 - 15x$$

ex: $x=1, x=2 \pm 4i$

$$(x-1) = 0 \quad x-2 = \pm 4i$$

$$(x-2)^2 = (\pm 4i)^2$$

$$x^2 - 4x + 4 = 16i^2$$

$$x^2 - 4x + 4 = -16$$

$$x^2 - 4x + 20 = 0$$

$$y = x^5 - 5x^4 + 6x^3 + 10x^2 - 27x + 15$$

$$y = (x-1)(x^2-4x+20)$$

$$x^3 - 4x^2 + 20x$$

$$-x^2 + 4x - 20$$

$$y = x^3 - 5x^2 + 24x - 20$$

* All imaginary and irrational roots come in conjugate pairs

If $2+3i$ is a root, then $2-3i$ is a root.

If $5-\sqrt{3}$ is a root, then $5+\sqrt{3}$ is a root.