§4.2

#6 How many complex solutions does $x^6 + 4x^2 + 12 = 0$ have?

Fundamental Theorem of Algebra: A polynomial of degree n has at least one complex root (zero).

Factor Theorem: If $x = c$ is a root of a polynomial, then $(x - c)$ is a factor of the polynomial.

$f(x) = x^3 - 27$, $x=3$ is a root. degree $= n = 3$

$= (x-3)(x^2+3x+9)$

degree $= n - 1 = 2$

$-1.722448199,\ 0.8612241000 - 2.495019209\,I,\ 0.8612241000 + 2.495019209\,I$

$u = x^2$

$x^2 = -1.722448199$

$\Rightarrow x = \pm\sqrt{-1.722448199} = \pm i\sqrt{1.722448199}$

$u = .8612241000 - 2.495019209\,i = x^2$

$x + yi$

$\theta = \arctan\left(\frac{-2.49\ldots}{.861\ldots}\right)$

$\sqrt{(.8612241000)^2 + (-2.495019209)^2} = r$

Use DeMoivre to find the square roots of the normal solutions.