Name
Date
Course

Polynomials (Part II): Irrational Zeros, Complex Zeros, & Alternative Methods for Solving Polynomial Equations (Homework)

Find the zeros of the polynomial functions below and write each function in factored form.

① $f(x) = -4x^3 + 20x + 8$

② $f(x) = x^3 - x^2 + 2$

③ $f(x)=3x^3-28x+3$

④ $f(x)=-x^3-2x^2+3$

⑤ $f(x) = x^4 - 2x^2 - 3$

⑥ $f(x) = 3x^4 + 17x^2 - 90$

Find the zeros of the following polynomial functions using the grouping method.

⑦ $f(x) = 4x^3 + 2x^2 + 6x + 3$

⑧ $f(x) = 6x^3 - 18x^2 - 7x + 21$

⑨ $f(x) = 9x^5 + 18x^4 - 4x - 8$

⑩ $f(x) = 3x^5 - 10x^4 - 75x + 250$

(11) $f(x) = 5x^4 - x^3 - 320x + 64$

(12) $f(x) = x^4 - x^3 - 125x + 125$

Answers

① $-2,\ 1-\sqrt{2},\ 1+\sqrt{2}$

$f(x) = (x+2)(x-(1-\sqrt{2}))(x-(1+\sqrt{2}))$

② $-1,\ 1-i,\ 1+i$

$f(x) = (x+1)(x-(1-i))(x-(1+i))$

③ $3,\ \frac{-9-\sqrt{93}}{6},\ \frac{-9+\sqrt{93}}{6}$

$f(x) = (x-3)(x-(\frac{-9-\sqrt{93}}{6}))(x-(\frac{-9+\sqrt{93}}{6}))$

④ $1,\ \frac{-3-i\sqrt{3}}{2},\ \frac{-3+i\sqrt{3}}{2}$

$f(x) = (x-1)(x-\frac{-3-i\sqrt{3}}{2})(x-\frac{-3+i\sqrt{3}}{2})$

⑤ $-\sqrt{3},\ \sqrt{3},\ -i,\ i$

$f(x) = (x+\sqrt{3})(x-\sqrt{3})(x+i)(x-i)$

⑥ $-\frac{\sqrt{30}}{3},\ \frac{\sqrt{30}}{3},\ 3i,\ -3i$

$f(x) = (x+\frac{\sqrt{30}}{3})(x-\frac{\sqrt{30}}{3})(x-3i)(x+3i)$

⑦ $-\frac{1}{2},\ -i\frac{\sqrt{6}}{2},\ i\frac{\sqrt{6}}{2}$

$f(x) = (x-\frac{1}{2})(x+i\frac{\sqrt{6}}{2})(x-i\frac{\sqrt{6}}{2})$

⑧ $3, -\frac{\sqrt{42}}{6}, \frac{\sqrt{42}}{6}$

$f(x) = (x-3)(x+\frac{\sqrt{42}}{6})(x-\frac{\sqrt{42}}{6})$

⑨ $-2, -\frac{\sqrt{6}}{3}, \frac{\sqrt{6}}{3}, -i\frac{\sqrt{6}}{3}, i\frac{\sqrt{6}}{3}$

$f(x) = (x+2)(x+\frac{\sqrt{6}}{3})(x-\frac{\sqrt{6}}{3})(x+\frac{i\sqrt{6}}{3})(x-i\frac{\sqrt{6}}{3})$

⑩ $\frac{10}{3}, -\sqrt{5}, \sqrt{5}, -i\sqrt{5}, i\sqrt{5}$

$f(x) = (x-\frac{10}{3})(x+\sqrt{5})(x-\sqrt{5})(x+i\sqrt{5})(x-i\sqrt{5})$

⑪ $\frac{1}{5}, 4, -2-2i\sqrt{3}, -2+2i\sqrt{3}$

$f(x) = (x-\frac{1}{5})(x-4)(x-(-2-2i\sqrt{3}))(x-(-2+2i\sqrt{3}))$

⑫ $1, 5, \frac{-5-5i\sqrt{3}}{2}, \frac{-5+5i\sqrt{3}}{2}$

$f(x) = (x-1)(x-5)(x-\frac{-5-5i\sqrt{3}}{2})(x-\frac{-5+5i\sqrt{3}}{2})$