Fundamental Theorem of Algebra

Homework

Factor the following polynomials over the complex numbers.

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

2) $P(x) = 3x^3 + 7x^2 + 7x + 4$

3) $P(x) = x^4 - x^3 + x^2 - 3x + 2$

Solutions

1) $P(x) = (x-2)(x+i)(x-i)$

2) $P(x) = (3x+4)\left(x+\frac{1}{2}+\frac{\sqrt{3}}{2}i\right)\left(x+\frac{1}{2}-\frac{\sqrt{3}}{2}i\right)$

3) $P(x) = (x-1)(x-1)\left(x+\frac{1}{2}-\frac{\sqrt{7}}{2}i\right)\left(x+\frac{1}{2}+\frac{\sqrt{7}}{2}i\right)$