Finding Integral Zeros

Fundamental Theorem of Algebra: A polynomial function $P(x)$ of degree n has exactly n complex zeros.

Multiple Zeros of a Polynomial: If a polynomial $P(x)$ has $x-r$ occurring as a factor exactly k times, then r is a **zero of multiplicity k** of the polynomial function $y=P(x)$.

Finding Integral Zeros of Polynomial Functions: Let $P(x)$ be a polynomial function in x with integral coefficients. Then the only possible zeros of $P(x)$ are the divisors of the constant term.

Practice Exercises

A. Find the roots of each polynomial function. Indicate the multiplicity of each root.

1. $f(x)=(x+4)^2(x-3)^3$
2. $h(x)=x(x-3)^4(x+6)^2$
3. $P(x)=x^2(x-9)$
4. $F(x)=(x+1)^2(x-5)$
5. $P(x)=(x+1)^5(x-1)^2$

B. Find the zeros of each function.

1. $P(x)=x^3-10x^2+32x-32$
2. $P(x)=x^3-6x^2+11x-6$
3. $P(x)=x^3-2x^2+4x-8$
4. $P(x)=x^4-5x^2+4$
5. $P(x)=x^3+x^2-12x-12$

Problem Set

A. Find the roots of each polynomial function. Indicate the multiplicity of each root.

1. $f(x)=(x+3)^3(x-1)^5$
2. $h(x)=x^2(x-5)^3(x+6)^4$
3. $P(x)=x^4(x-5)$
4. $F(x)=(x+3)^4(x-7)$
5. $P(x)=(x+3)^4(x-3)^4$

B. Find the zeros of each function.

1. $P(x)=x^3-3x-2$
2. $P(x)=x^4-13x^2+36$
3. $P(x)=x^4-3x^3-53x^2-9x$
4. $P(x)=x^3+3x^2-4x-12$
5. $P(x)=x^3+7x^2+2x-40$

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