Section 3.3: Zeros of Polynomial Functions

Video 1

1) Determine whether $x+4$ is a factor of the polynomial.

a) $f(x)=2x^4+8x^3-7x^2-19x+36$

b) $f(x)=-3x^3-7x^2+8x-55$

2) Factor $f(x) = 3x^3 + 4x^2 - 148x + 96$, given that 6 is a zero.

Video 2

3) For the polynomial function $f(x) = 2x^3 + 11x^2 + 10x - 8$, list all possible rational roots. Then find all rational zeros and factor $f(x)$ into linear functions.

4) For the polynomial function $f(x)=6x^4+17x^3-14x^2-27x+18$, list all possible rational roots. Then find all rational zeros and factor $f(x)$ into linear factors.

Video 3

5) Find a third-degree polynomial $f(x)$ with real coefficients that has zeros of 2, 5, and -4 such that $f(3)=10$.

6) Find a third-degree polynomial $f(x)$ with real coefficients for which -3 is a zero of multiplicity 2, 8 is also a zero, and $f(1) = -6$.

Video 4

Conjugate Zeros Theorem

If $f(x)$ is a polynomial function with real coefficients, and if $z = a + bi$ is a zero, then the conjugate of z, $\overline{z} = a - bi$ is also a zero.

7) Find all zeros of $f(x) = 2x^4 - 15x^3 + 18x^2 + 90x - 200$, given that $3 + i$ is a zero.

Video 5

Descartes' Rule of Signs

If $f(x)$ is a polynomial function with real coefficients and a nonzero constant term,

a) The number of positive real zeros of *f* either equals the number of variations in sign occurring in the coefficients of $f(x)$, or is less than that by a positive even integer.

b) The number of negative real zeros of *f* either equals the number of variations in sign occurring in the coefficients of $f(-x)$, or is less than that by a positive even integer.

8) Determine the possible numbers of positive, negative, and nonreal complex zeros of $f(x) = -3x^4 + 15x^3 - 50x + 17$.

9) Determine the possible numbers of positive, negative, and nonreal complex zeros of $f(x) = x^4 - 18x^3 + 25x^2 - 35x + 14$.