1. Solve each equation. State the number and type of roots.
   a. $0 = x^2 + 6x + 9$

   b. $x^3 + 25x = 0$

A n th degree polynomial has _____ zeros.

KeyConcept Descartes' Rule of Signs

Let $P(x) = a_n x^n + \cdots + a_1 x + a_0$ be a polynomial function with real coefficients. Then

- the number of positive real zeros of $P(x)$ is the same as the number of changes in sign of the coefficients of the terms, or is less than this by an even number, and
- the number of negative real zeros of $P(x)$ is the same as the number of changes in sign of the coefficients of the terms of $P(-x)$, or is less than this by an even number.

2. State the possible number of positive, real zeros, negative real zeros, and imaginary zeros of $f(x) = x^6 + 3x^5 - 4x^4 - 6x^3 + x^2 - 8x + 5$.

3. State the possible number of positive, real zeros, negative real zeros, and imaginary zeros of $f(x) = 2x^5 + x^4 + 3x^3 - 4x^2 - x + 9$.

4. State the possible number of positive, real zeros, negative real zeros, and imaginary zeros of $f(x) = -x^5 + 14x^3 + 18x - 36$.

5. State the possible number of positive, real zeros, negative real zeros, and imaginary zeros of $f(x) = x^4 - 2x^2 - 5x + 19$.

KeyConcept Complex Conjugates Theorem

Words	Let a and b be real numbers, and $b \neq 0$. If $a + bi$ is a zero of a polynomial function with real coefficients, then $a - bi$ is also a zero of the function.
Example	If $3 + 4i$ is a zero of $f(x) = x^3 - 4x^2 + 13x + 50$, then $3 - 4i$ is also a zero of the function.

6. Write a polynomial function of least degree with integral coefficients, the zeros of which include -1 and $5 - i$.

7. Write a polynomial function of least degree with integral coefficients, the zeros of which include -1 and $1 + 2i$.

8. Write a polynomial function of least degree with integral coefficients, the zeros of which include $-3,\ 1,$ and $-3i$