1. If $f(x)=3x^4-2x^3+5x+2$, find $f(4)$
   a. Synthetic Substitution
   b. Direct Substitution

2. Given that $x+2$ is a factor of x^3-3x+2, find the remaining factors of the polynomial.

KeyConcept Rational Zero Theorem

Words	If $P(x)$ is a polynomial function with integral coefficients, then every rational zero of $P(x) = 0$ is of the form $\frac{p}{q}$, a rational number in simplest form, where p is a factor of the constant term and q is a factor of the leading coefficient.
Example	Let $f(x) = 6x^4 + 22x^3 + 11x^2 - 80x - 40$. If $\frac{4}{3}$ is a zero of $f(x)$, then 4 is a factor of -40, and 3 is a factor of 6.

3. List all possible rational zeros of the following:
   a. $f(x)=4x^5+x^4-2x^3+5x^2+8x+16$

4. Find all the zeros of the following functions:
   a. $h(x) = 9x^4 + 5x^2 - 4$

   b. $k(x) = 2x^4 - 5x^3 + 20x^2 - 45x + 18$

   c. $f(x) = 3x^3 - 2x^2 - 8x + 5$

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.

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

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

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 $-3i$