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Section 1.2 Summary

BLM 1–7
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Finite Differences

For a polynomial function of degree n, where n is a positive integer, the nth differences

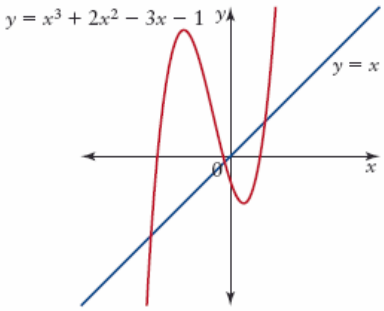
- are equal (or constant)
- have the same sign as the leading coefficient
- are equal to $a[n \times (n-1) \times \ldots \times 2 \times 1]$, where a is the leading coefficient

KEY CONCEPTS

Key Features of Graphs of Polynomial Functions With Odd Degree

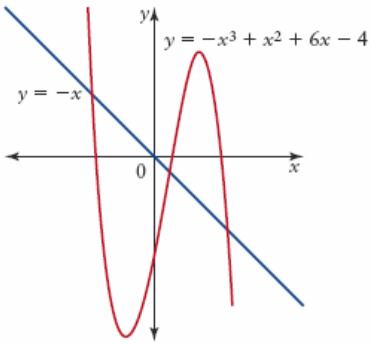
Positive Leading Coefficient

- the graph extends from quadrant 3 to quadrant 1 (similar to the graph of $y = x$)



Negative Leading Coefficient

- the graph extends from quadrant 2 to quadrant 4 (similar to the graph of $y = -x$)



- Odd-degree polynomials have at least one x-intercept, up to a maximum of n x-intercepts, where n is the degree of the function.
- The domain of all odd-degree polynomials is $\{x \in \mathbb{R}\}$ and the range is $\{y \in \mathbb{R}\}$. Odd-degree functions have no maximum point and no minimum point.
- Odd-degree polynomials may have point symmetry.

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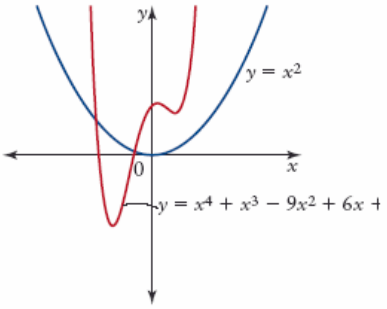
Key Features of Graphs of Polynomial Functions With Even Degree

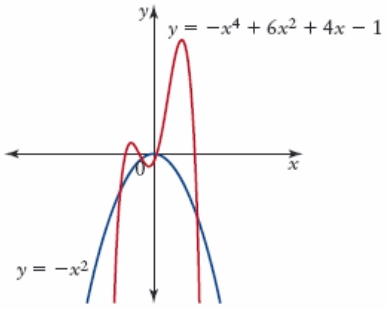
Positive Leading Coefficient

- the graph extends from quadrant 2 to quadrant 1 (similar to the graph of $y = x^2$)
- the range is $\{y \in \mathbb{R}, y \geq a\}$, where a is the minimum value of the function
- an even-degree polynomial with a positive leading coefficient will have at least one minimum point



Negative Leading Coefficient

- the graph extends from quadrant 3 to quadrant 4 (similar to the graph of $y = -x^2$)
- the range is $\{y \in \mathbb{R}, y \leq a\}$, where a is the maximum value of the function
- an even-degree polynomial with a negative leading coefficient will have at least one maximum point



- Even-degree polynomials may have from zero to a maximum of n x-intercepts, where n is the degree of the function.
- The domain of all even-degree polynomials is $\{x \in \mathbb{R}\}$.
- Even-degree polynomials may have line symmetry.

Key Features of Graphs of Polynomial Functions

- A polynomial function of degree n, where n is a whole number greater than 1, may have at most $n - 1$ local minimum and local maximum points.
- For any polynomial function of degree n, the nth differences
  - are equal (or constant)
  - have the same sign as the leading coefficient
  - are equal to $a[n \times (n - 1) \times \ldots \times 2 \times 1]$, where a is the leading coefficient