

7.2 Graphing Polynomial Functions

0011 0010 1010 1101 0001 0100 1011

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End Behavior

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- A polynomial of odd degree with a positive leading coefficient has negative y -values for large negative x -values, and positive y -values for large positive x -values.
- A polynomial of even degree with a positive leading coefficient has positive y -values for both large positive and large negative x -values.

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Factor Theorem

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Let $P(x)$ be a polynomial with real-number coefficients. Then $(x-a)$ is a factor of $P(x)$ if and only if $P(a) = 0$.

If a polynomial has a zero of odd multiplicity, the graph crosses the x -axis at that point. If a polynomial has a zero of even multiplicity, the graph “bounces off” the x -axis at that point.

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Steps to Graph a Polynomial

- Obtain the y-intercept.
- Factor the polynomial completely to locate the x-intercepts.
- Use the behavior of the ends and the multiplicity of the zeros to determine the shape.

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Examples

- Graph $g(x) = (x + 4)^2(x - 2)$
- Graph $h(x) = (x + 1)^3(x - 2)^2$
- Graph $s(x) = x^4 + 3x^3 - x^2 - 3x$
- Graph $m(x) = x^4 - 13x^2 + 36$

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