Characteristics of Polynomials Sept 18/2014

Although the graphs of polynomials can appear very different, they also have many common and predictable properties.

(1) Even/Odd Polynomials

The order or degree is the highest exponent, and this value (even or odd) determines some behaviours.

(2) Leading Coefficient

The sign of the coefficient of the highest order term will determine if the polynomial is reflected, affecting the overall appearance of the graph:
- how the graph starts/ends
- end behaviour
- direction of opening (for even polynomials)

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(3) Turning Points

A turning point occurs whenever the graph changes from increasing to decreasing, or decreasing to increasing.

(4) Extreme Values

Absolute maximum or minimum values are the greatest or least values for the entire polynomial (i.e., entire domain).

Even polynomials will always have ~~an~~ one absolute extrema.
Odd polynomials will never have an absolute extrema.

Local extrema occur at any other turning points which are not absolute extrema.

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(5) Number of Zeroes

Zeroes occur where the graph crosses the x-axis.

Even polynomials may have no zeroes, or more.
Odd polynomials must have at least one zero.

(6) End Behaviour

Even polynomials have identical behaviour at each end.
Odd polynomials have opposite behaviour at each end.

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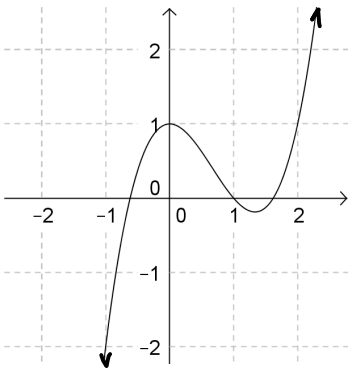
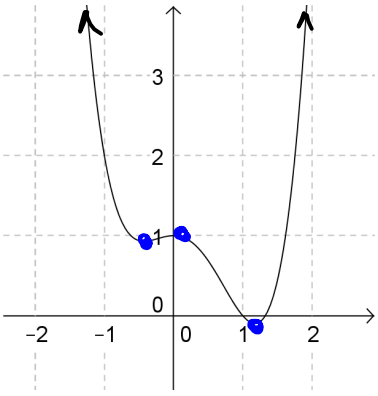


cubic

degree? 3
T.P.? 2
sign of a? $a > 0$
even/odd degree? odd
end behaviour?

as $x \to \infty$, $y \to \infty$
as $x \to -\infty$, $y \to -\infty$



quartic

degree? 4
T.P.? 3
sign of a? $a > 0$
even/odd degree? even
end behaviour?

as $x \to \infty$, $y \to \infty$
as $x \to -\infty$, $y \to \infty$

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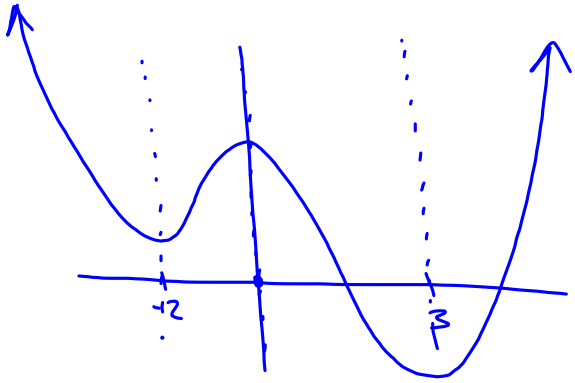
Assigned Work:

p.136 # 5, 7, 8, 9, 12, 14, 15, 16

12. $D = \{x \in \mathbb{R}\}$

"The range is a subset of the set of real numbers"



"The domain ~~and range~~ are the..."

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14.

(a)

even function → even symmetry

even-ordered function → highest order exponent is an even number.

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