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6.1 Graphs of Polynomial Functions

end behaviour: the shape or direction of a graph as x gets either very large or very small

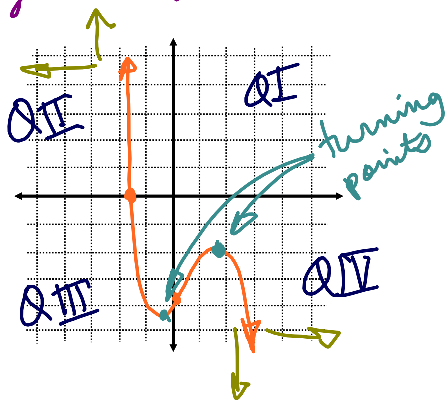
largest exponent

cubic function: a polynomial of degree 3

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

leading coefficient

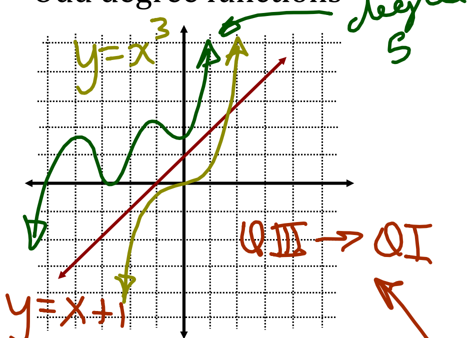
features:
- only one y-intercept
- up to 3 x-intercepts
- domain: $x \in \mathbb{R}$
- range: $y \in \mathbb{R}$
- end behaviour (EB) for positive $f(x)$: from QIII → QI



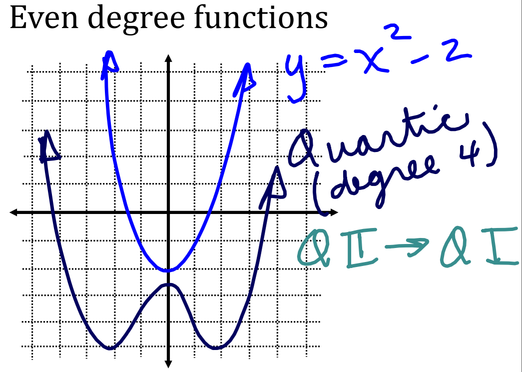
turning point: point where a function changes from increasing to decreasing (or vice versa)... the maximum number of turning points is always one less than the degree

End Behaviour is similar for...

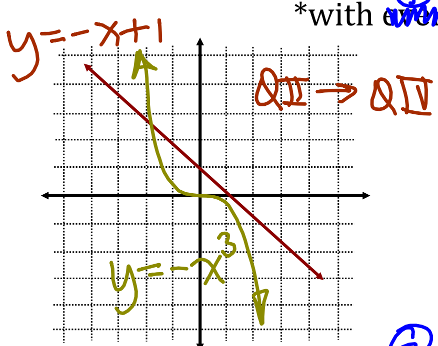
Odd degree functions

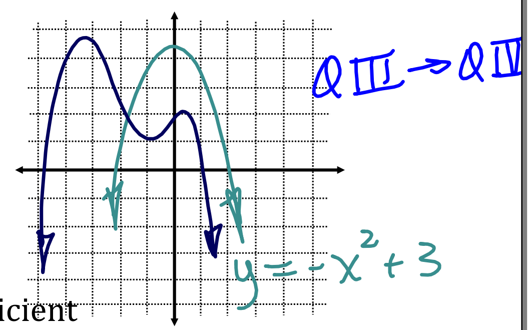


Even degree functions



*with ~~even~~ + leading coefficient





*with ~~odd~~ − leading coefficient

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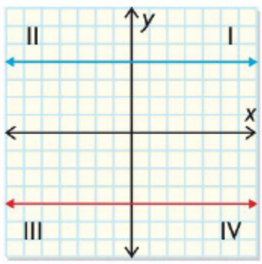
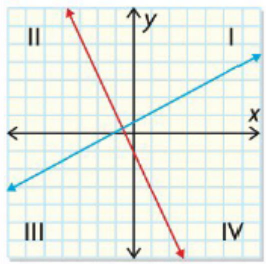
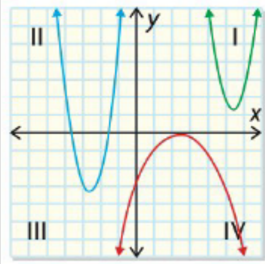
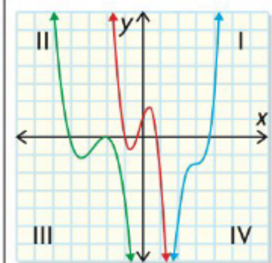
Need to Know

- The graphs of polynomial functions of the same degree have common characteristics.
- The chart below shows sample sketches of functions and displays all the possibilities for the x-intercepts, y-intercepts, end behaviour, range, and number of turning points for each type of function.

Type of Function	constant	linear	quadratic	cubic
Degree, n	0	1	2	3
Sketch				
Number of x-Intercepts	0, except for $y = 0$, for which every point is on the x-axis	1	0, 1, or 2	1, 2, or 3
Number of y-Intercepts	1	1	1	1
End Behaviour	Line extends from quadrant II to quadrant I or from quadrant III to quadrant IV.	Line extends from quadrant III to quadrant I or from quadrant II to quadrant IV.	Curve extends from quadrant II to quadrant I or from quadrant III to quadrant IV.	Curve extends from quadrant III to quadrant I or from quadrant II to quadrant IV.
Domain	$\{x \mid x \in R\}$	$\{x \mid x \in R\}$	$\{x \mid x \in R\}$	$\{x \mid x \in R\}$
Range	$\{y \mid y = \text{constant}, y \in R\}$	$\{y \mid y \in R\}$	$\{y \mid y \leq \text{maximum}, y \in R\}$ or $\{y \mid y \geq \text{minimum}, y \in R\}$	$\{y \mid y \in R\}$
Number of Turning Points	0	0	1	0 or 2

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