Unit 1 Polynomial Functions

Chapter 3

3.1 : Characteristics of Polynomial Functions

polynomial functions: a function of the form $f(x) = a_n x^n + a_{n-1} x^{n-1} + a_{n-2} x^{n-2} \ldots + ax + a_0$

exs: Linear $\Rightarrow y = 3x - 5$

Quadratic $\Rightarrow y = 3x^2 - 5x + 1$

Cubic $\Rightarrow y = 3x^3 - 5x^2 + x - 6$

Quartic $\Rightarrow y = 3x^4 - 5x^3 + x^2 - 6x - 2$

Quintic $\Rightarrow y = 3x^5 - 5x^4 + x^3 - 6x^2 - 2x + 7$

Degree: the highest power of the variable in a polynomial function.

end behaviour: the behaviour of the y-values of a function as $|x|$ becomes very large.

Shapes of Graphs of Polynomials

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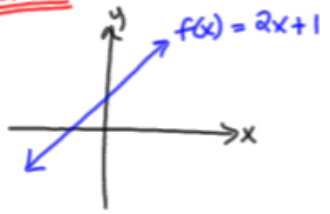
Linear



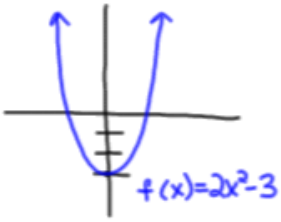
line
positive
one x-intercept
D: $\{x \mid x \in R\}$
R: $\{y \mid y \in R\}$

end behavior: extends up into Q1 and down into Q3.

negative slope

end behavior
extend up in Q2 and down in Q4.

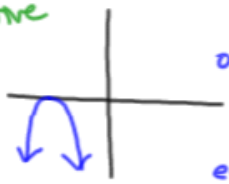
Quadratics



Degree of 2
positive
two x-intercepts
D: $\{x \mid x \in R\}$
R: $\{y \mid y \geq -3, y \in R\}$

end behavior: extends up into Q1 & Q2.

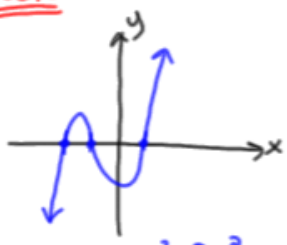
Negative



one x-intercept
R: $\{y \mid y \leq 0, y \in R\}$

end behavior: extends down in Q3 & Q4.

Cubic

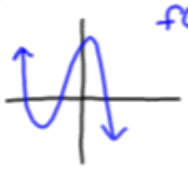


Degree → 3
'N'-shape
3 x-intercepts
D: $\{x | x \in R\}$
R: $\{y | y \in R\}$

$f(x) = x^3 + 2x^2 - x - 2$

end behaviour
extends down in Q3 and up in Q1

Negative



$f(x) = -x^3 \ldots\ldots$

end behavior: up into Q2 and down Q4.

Sketch a positive cubic with two x-intercepts.

* Still degree of 3, still 3 roots (one single, one double)