3.1 & 3.2 Introduction to Polynomial Functions

Form of a polynomial function -

linear : $y = ax + b$
quadratic : $y = ax^2 + bx + c$
cubic : $y = ax^3 + bx^2 + cx + d$

Polynomial of degree n:

$$P(x) = a_n x^n + a_{n-1}x^{n-1} + a_{n-2}x^{n-2} + \dots + a_1 x^1 + \underline{a_0}$$

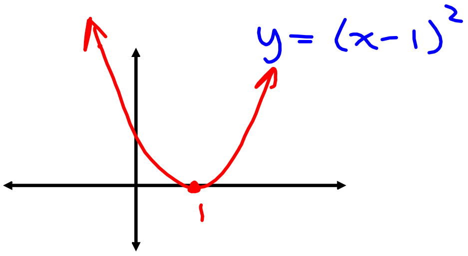
constant = y-int.

Polynomial functions are ALWAYS

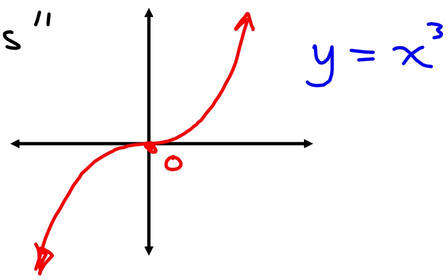
→ degree one or more
→ exponents $\in$ Natural number. set $\{1, 2, \dots\}$
→ max # of turning points is one less than the degree
→ domain $= \{x \in \mathbb{R}\}$ or $x \in (-\infty, \infty)$
→ continuous

Roots

* double root "bounces" off the x-axis



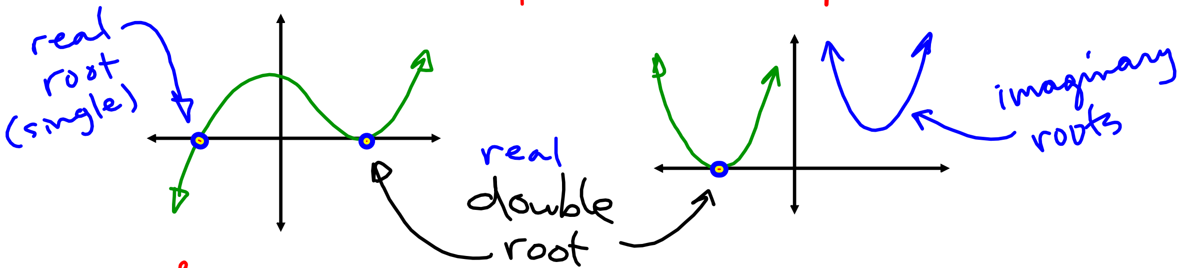
* triple root "skims" along the x-axis



X-Intercepts... Zeroes... (Roots, solutions...)

An n-degree function has n roots

→ these may be real, imaginary (complex), or "multiple" zeroes



* The minimum # of real roots for $y = P(x)$

ODD $P(x)$ ⇒ one root

EVEN $P(x)$ ⇒ none

Turning Points

→ EVEN $P(x)$ has, at most $n-1$ turning points (odd number)

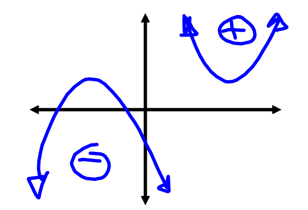
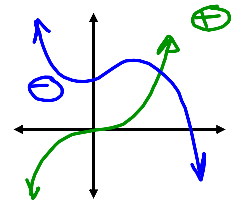
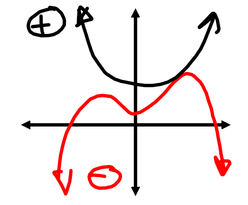
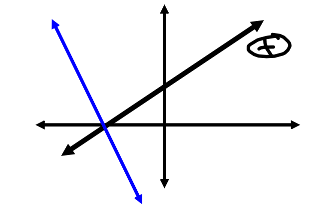
→ ODD $P(x)$ has, at most $n-1$ T.P.s (even number)

End Behaviour (for ⊕ $P(x)$)

ODD → low to high [Q III → Q I]

EVEN → high to high [Q II → Q I]

3.12 Intro to polynomial functions **September 14, 2016**

	Quadratic	Cubic	Quartic	linear ~~Quintic~~
EQUATION	$f(x)=a_2x^2+a_1x+a_0$	$f(x)=a_3x^3+a_2x^2+a_1x+a_0$	$f(x)=a_4x^4+a_3x^3+a_2x^2+a_1x+a_0$	$f(x)=a_1x+a_0$
Degree	2	3	4	
General Shape				
Turning Points	1	0 , 2	3 , 1	0
Y – intercept	a_0	a_0	a_0	a_0
End Behaviour	+ high → high − low → low	+ low → high − high → low	+ high → high − low → low	+ low → high − high → low

is determined by the sign of the leading coefficient

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