# Chp. 5: Polynomial Functions

**polynomial function:** expression with coefficients and variables

**Linear** (degree of 1)

$ax + b$

ex) $2x + 4$

leading coefficient

**Quadratic** (degree of 2)

$ax^2 + bx + c$

ex) $-x^2 + 5x + 3$

leading coefficient $= -1$

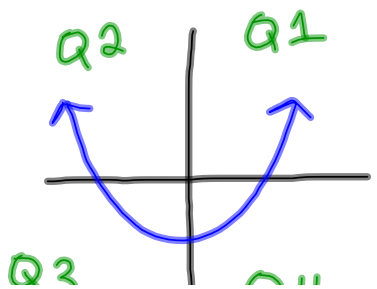
**Cubic** (degree of 3)

$ax^3 + bx^2 + cx + d$

ex) $4x^3 - 6$

## End behavior

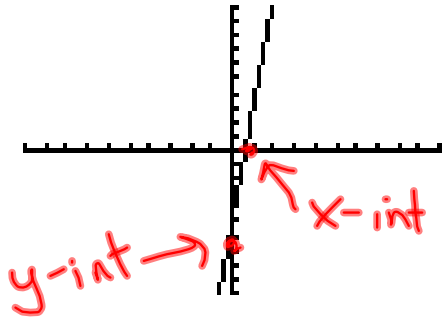
Where the ends of a graph extends.




extends up in Quadrants 1 + 2.

Linear $y = 8x - 5$

positive leading coefficient



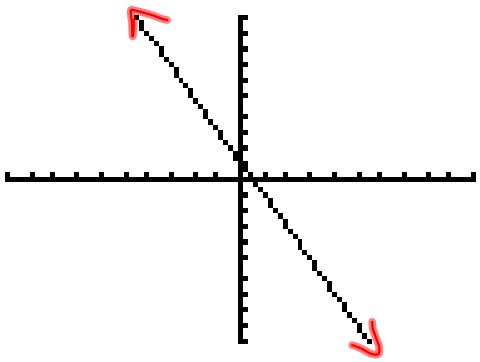

End behaviour

Extends up in Q1
Down in Q3.

- no turning point

$y = -2x + 1$

negative



End behavior

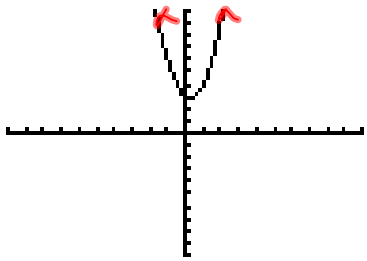
extends up in Q2
down in Q4

# Quadratics

$y = 2x^2 - x + 3$

→ positive

1 turning pt

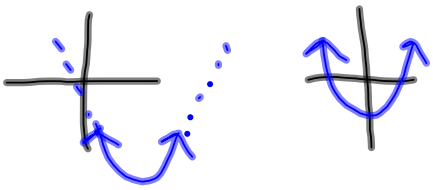


## End behavior

Extends up in Q1 & Q2

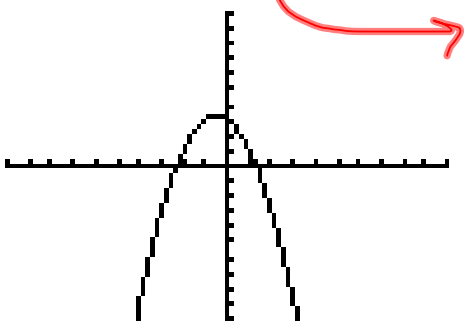
* All positive quadratics extend up in Q1 & Q2.

exs)



$y = -x^2 - x + 3$

→ negative

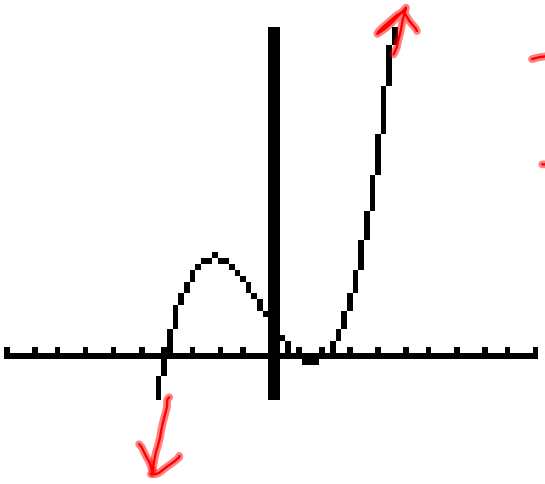


## End behavior

Extends down in Q3 & Q4

# Cubic

$x^3 + x^2 - 10x + 8$



→ positive

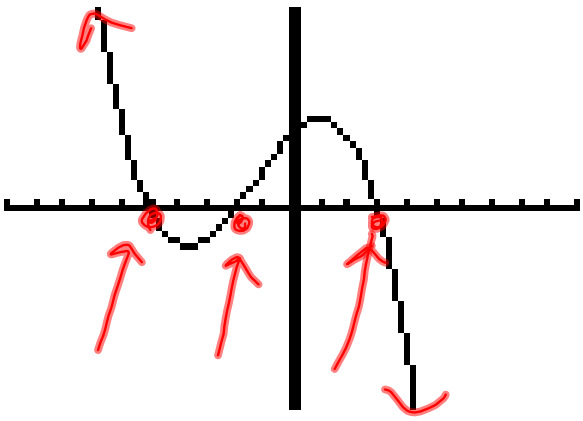
→ two turning points

## End Behavior

Extends up in Q1 & down in Q3

$y = -(x-3)(x+2)(x+5)$

$-x^3$



3-x intercepts

— negative leading coefficient

— two turning pts

EB: extends up Q2 & down in Q4

# Domain & Range

**Domain**: all x-values

→ where the graph extends left → right.

**Range**: all y-values

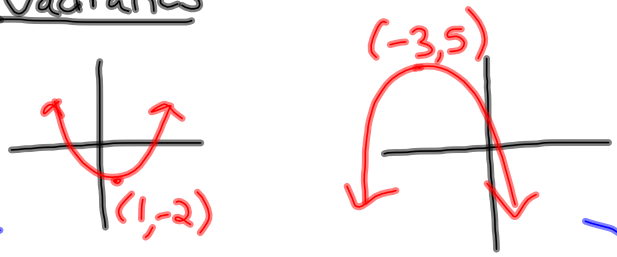
→ where the graph extends up & down.

## Linear

D: $x \in R$
R: $y \in R$

* no restriction ALWAYS!

## Quadratics




D: $x \in R$ (ALWAYS!)

* Range Changes!

R: $\{y \mid y \geq -2, y \in R\}$

R: $\{y \mid y \leq 5, y \in R\}$