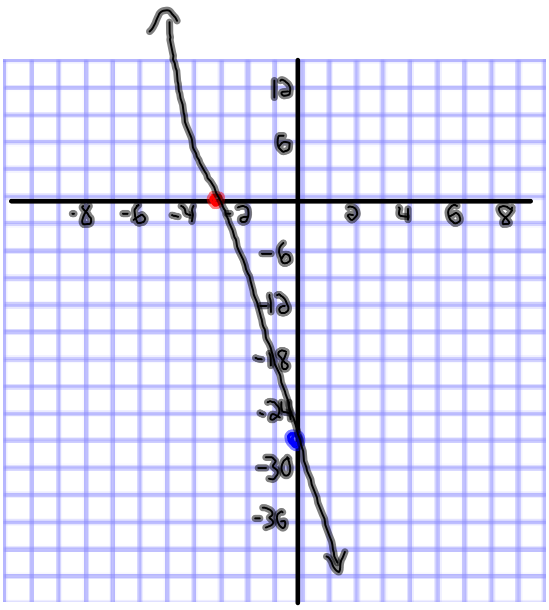
Questions From Homework



① e) $y = -(x+3)^3$

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

(i) Roots $(y=0)$

$x = -3, -3, -3$ Triple Root

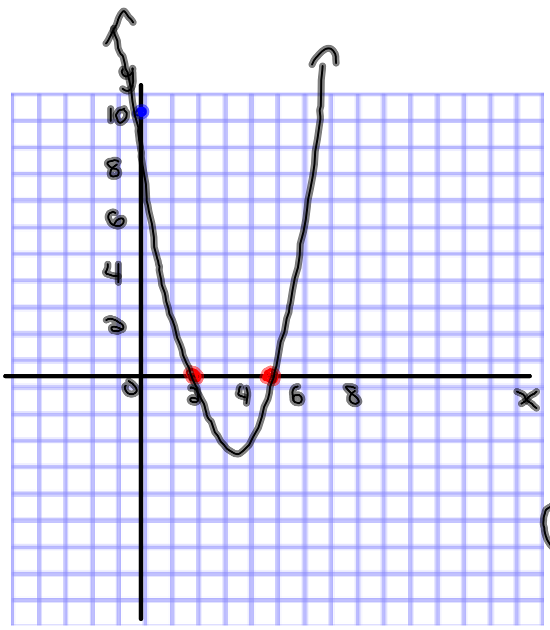
(ii) Degree → 3rd

(iii) y int $(x=0)$

$y = -(0+3)^3$

$y = -27$

(iv) Stretch: $a = -1$



$a = 1$ opens up

① b) $y = (x-5)(x-2)$

(i) Roots: $(y=0)$

$0 = (x-5)(x-2)$

$x = 2, 5$ $(2,0)$ & $(5,0)$

(ii) Degree: 2

(iii) y intercept: $(x=0)$

$y = (0-5)(0-2)$

$y = 10$ $(0,10)$

Polynomial Functions

Polynomial - an algebraic expression consisting of two or more terms. A polynomial usually contains only one variable. Within each term the variable is raised to a non-negative integer power, and is multiplied by a constant. The simplest types of polynomials are binomials (two terms) and trinomials (three terms)

Degree of a Polynomial - the greatest power to which the variable is raised; for example, the degree of the trinomial $x^4 - 2x + 5$ **is 4**

A *polynomial* function with real coefficients can be represented by

$$y = f(x) = ax^n + bx^{n-1} + cx^{n-2} + \ldots + \square x^0$$

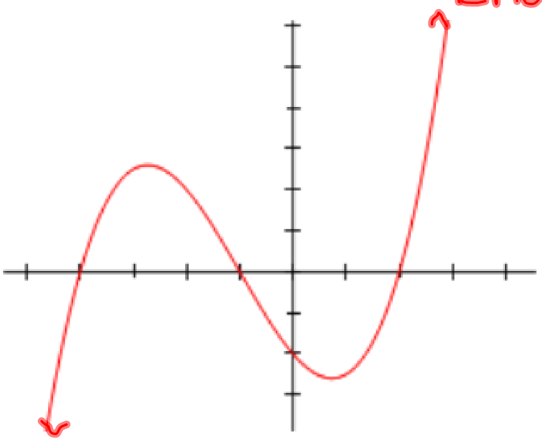
where *a, b, c, etc.* are real numbers. The shape of the graph of the function is affected by the value of *n (the Degree of the Polynomial)*, the values of the cooefficients, and whether the value of *a* is positive or negative.

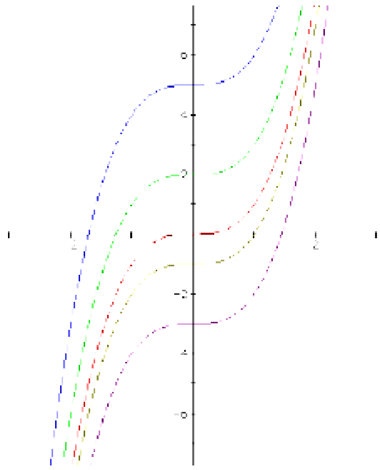
Cubic Functions

3rd degree Polynomials. ⟷ $y = ax^3 + bx^2 + cx + d$

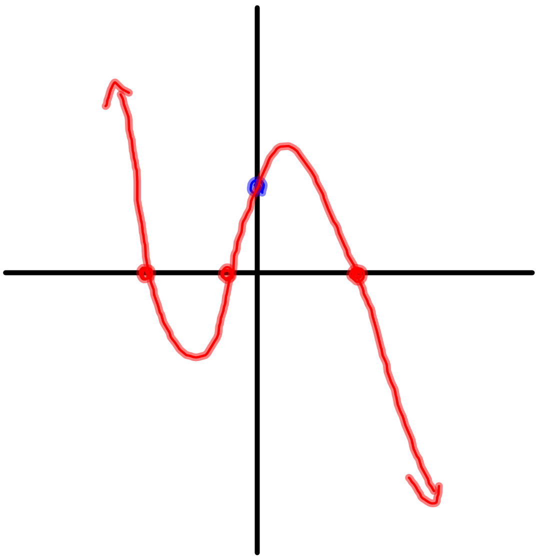
factored form $y = a(x - r_1)(x - r_2)(x - r_3)$

a > 0 (Positive) Starts in Q3
Ends in Q1





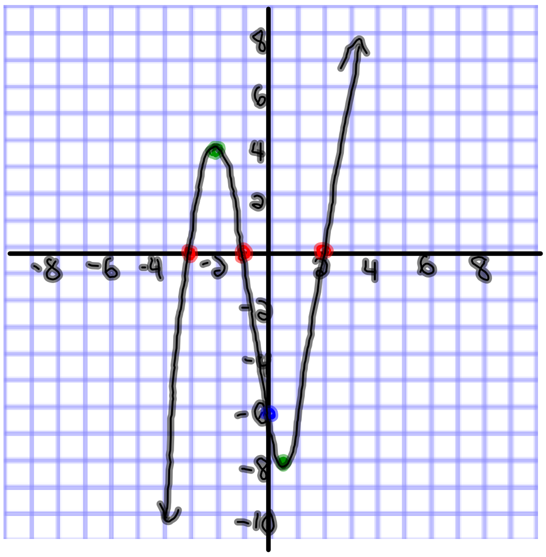
a < 0 (Negative) Starts in Q2
Ends in Q4



Local Maximum - is the highest point in its immediate region of *x-values.*
This may or may not be the greatest value of the function over its entire domain.

Local Minimum - is the lowest point in its immediate region of *x-values.*
This may or may not be the smallest value of the function over its entire domain.

Approximate Local Max and Min values!



Stretch → $y = (x-2)(x+1)(x+3)$

① Roots $(y=0)$

$0 = (x-2)(x+1)(x+3)$

$x = -3, -1, 2$

② y int $(x=0)$

$y = (0-2)(0+1)(0+3)$

$y = (-2)(1)(3)$

$y = -6$

③ Degree → 3^{rd}

④ Stretch: $a = 1$

⑤ Local Max $(x=-2)$

$y = (x-2)(x+1)(x+3)$

$y = (-2-2)(-2+1)(-2+3)$

$y = (-4)(-1)(1)$

$y = 4$

$(-2, 4)$

Local min $(x=0.5)$

$y = (x-2)(x+1)(x+3)$

$y = (0.5-2)(0.5+1)(0.5+3)$

$y = (-1.5)(1.5)(3.5)$

$y = -7.875$

$(0.5, -7.875)$

Calculating Max and Min values on the TI-83

Homework

② b) $y = 2x^2 + 9x + 14$

$\frac{9}{2} \times \frac{1}{2} = \left(\frac{9}{4}\right)^2 = \frac{81}{16}$

$y - 14 = 2x^2 + 9x$

$y - 14 = 2\left(x^2 + \frac{9}{2}x\right)$

$y - \frac{14}{1} + \frac{81}{8} = 2\left(x^2 + \frac{9}{2}x + \frac{81}{16}\right)$

$y - \frac{112}{8} + \frac{81}{8} = 2\left(x + \frac{9}{4}\right)^2$

$y - \frac{31}{8} = 2\left(x + \frac{9}{4}\right)^2$

$y = 2\left(x + \frac{9}{4}\right)^2 + 31/8$

$\left(-\frac{9}{4}, \frac{31}{8}\right)$