MAT A29 – Wk 1

We continue review.

Last class we reviewed

Horizontal lines : $y=c$
Vert. lines : $x=d$
Oblique lines : $y=mx+b$ $(m\neq 0)$

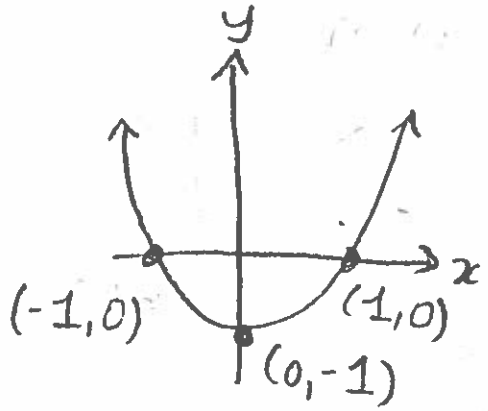
Parabolas

Defn : $f(x)=ax^2+bx+c$ (where $a\neq 0$) is a QUADRATIC function.

Ex: Make a table of values for $f(x)=x^2+x+1$

x	$f(x)$
-1	1
0	1
1	3
2	7

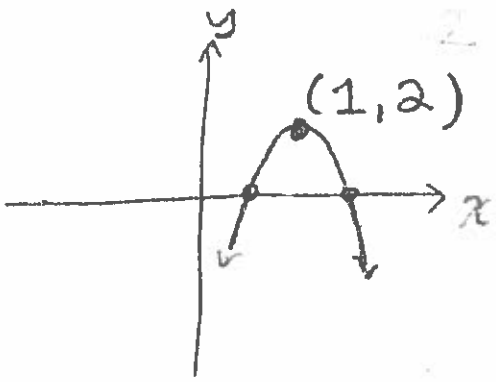
Ex: Sketch the quadratic $f(x)=x^2-1$.



Ex: Sketch the quadratic

$f(x)=-x^2+2x+1$

$=-(x-1)^2+2$



Factoring (con't)

Ex: Factor x^2+5x+6

We want:

Product = 6

Sum = 5

We note $6 = 2 \cdot 3$.

Thus

$$x^2+5x+6 = (x+2)(x+3)$$

Ex: Factor $x^2+3x-10$

Product = -10

Sum = 3

We note $-10 = (-2)\cdot 5$

Thus

$$x^2+3x-10 = (x-2)(x+5)$$

Quadratic Formula

Fact: The equation

$$ax^2+bx+c=0$$

has solutions

$$x = \frac{-b+\sqrt{b^2-4ac}}{2a} \quad \text{and}$$

$$x = \frac{-b-\sqrt{b^2-4ac}}{2a}$$

Ex: Solve $x^2-x-1=0$.

Apply the quadratic formula with

$a=1,\ b=-1,\ c=-1$

$$x = \frac{1 \pm \sqrt{1-4\cdot(1)(-1)}}{2\cdot 1}$$

$$= \frac{1\pm\sqrt{5}}{2}$$

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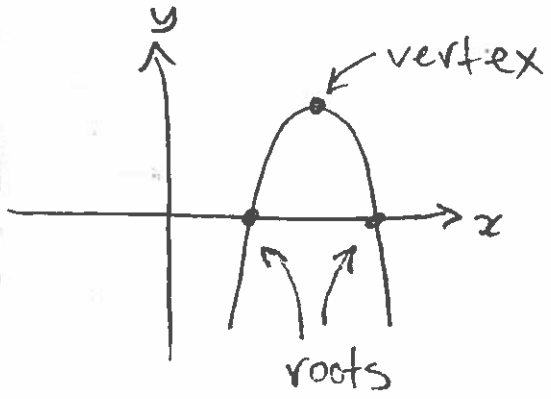
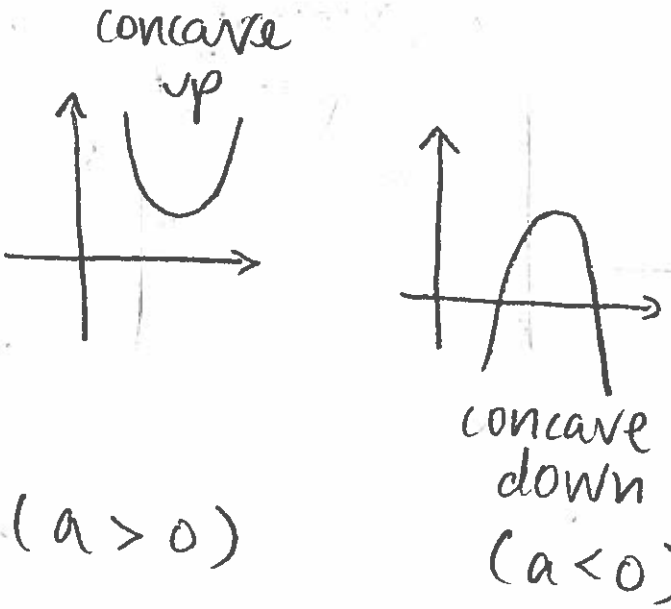
Parts of Parabolas





$(a > 0)$ $(a < 0)$

Fact:

The vertex is where the function $f(x)$ is: maximized $(a<0)$ minimized $(a>0)$

Oooh! Ahhh!

Factoring

Recall,

$$(x+1)(x+2)$$
$$= x(x+2) + 1(x+2)$$
$$= x^2 + 2x + 1x + 1\cdot 2$$
$$= x^2 + (1+2)x + 1\cdot 2$$

In general,

$$(x+p)(x+q)$$
$$= x^2 + (p+q)x + pq$$

Fact:

The roots of $f(x) = x^2 + bx + c$ have sum $-b$ and product c.