Math 1496 - Calc I

Review

Representing Functions

So for linear $y = mx+b$

parabola $y = ax^2+bx+c$

1// In general polynomials

$$y = a_n x^n + a_{n-1} x^{n-1} + \cdots a_2 x^2 + a_1 x + a_0$$

where $a_0, a_1, \cdots a_n$ are real #'s.

2// Rational Functions

$$f(x) = \frac{p(x)}{q(x)} \qquad p, q \text{ polynomials}$$

ex $y = \dfrac{x}{x^2+1}$

3// Algebraic Functions - using algebra

$$y = \sqrt{x^2+2}, \qquad y = \frac{x^2}{(x-1)^{3/2}}$$

4a

Exponential Functions

$$f(x) = a^x, \quad a \neq \text{not } 1$$

4b

Logarithmic Functions

$$f(x) = \log_a x \qquad a > 0,\ a \neq 1$$

Special cases $a = 10$, $a = e = 2.71828\ldots$

with e $f(x) = \ln x$ natural log.

5 Trigonometric Functions

sin x, cos x, tan x, cot x sec x, csc x

Inverse Trig Functions

$\sin^{-1}x$, $\cos^{-1}x$, $\tan^{-1}x$, $\cot^{-1}x$ $\sec^{-1}x$ $\csc^{-1}x$

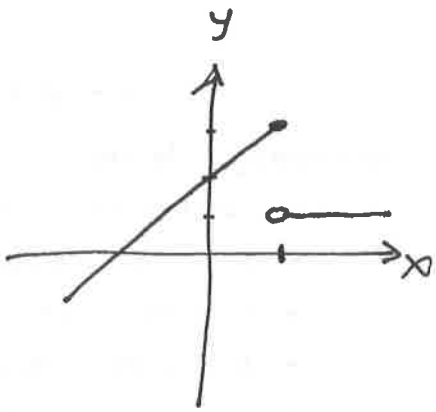
also written as

arcsin x, arc cos x etc

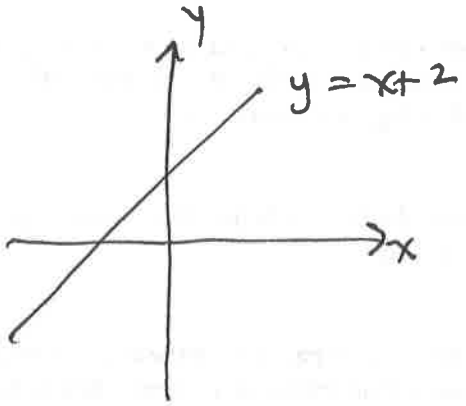
All grouped into Transcendental functions

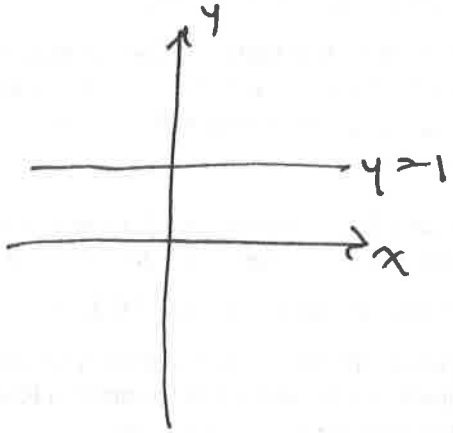
Piecewise Defined

Ex $f(x) = \begin{cases} x+2 & x \le 1 \\ 1 & x > 1 \end{cases}$ →



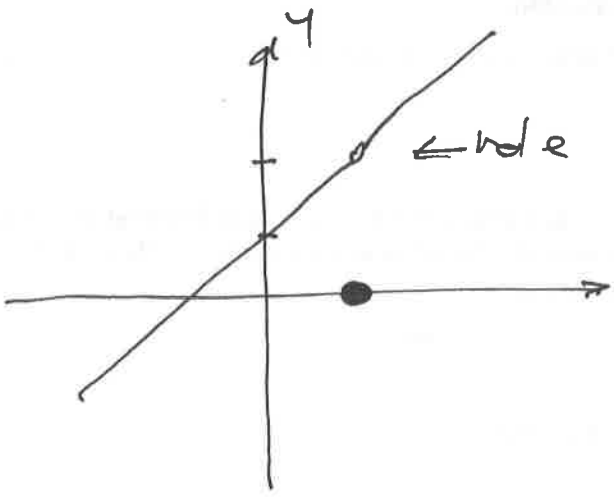
note hole





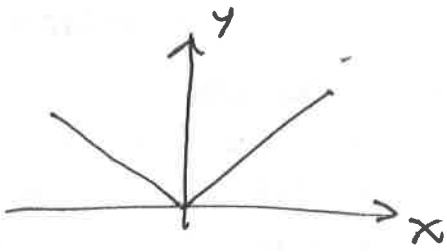
ex $f(x) = \begin{cases} \dfrac{x^2-1}{x-1} & x \neq 1 \\ 0 & x = 1 \end{cases}$

note $\dfrac{x^2-1}{x-1} = \dfrac{(x-1)(x+1)}{x-1} = x+1$ if $x \neq 1$ more later on this



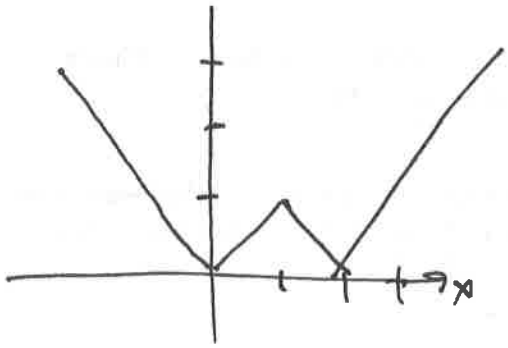
Important One – ~~Abs~~ Absolute Function

$$y = |x| = \begin{cases} x & x \geq 0 \\ -x & x < 0 \end{cases}$$



Sometimes we just have a graph

Ex



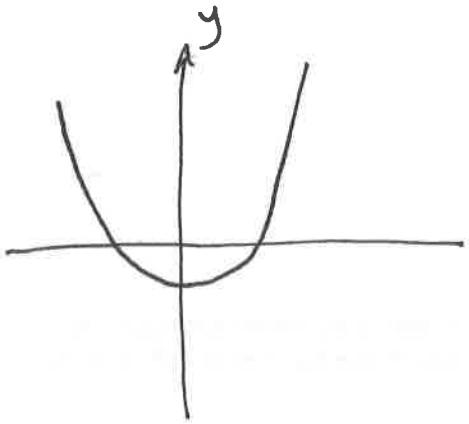
so we get info from the graph.

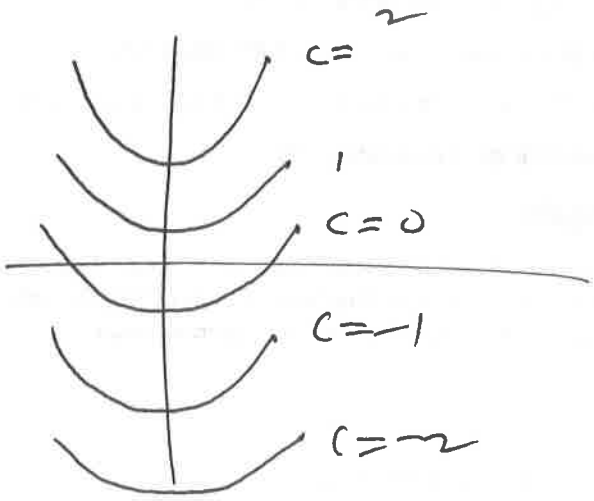
Transformation of Functions & Graph

Suppose $f(x)$

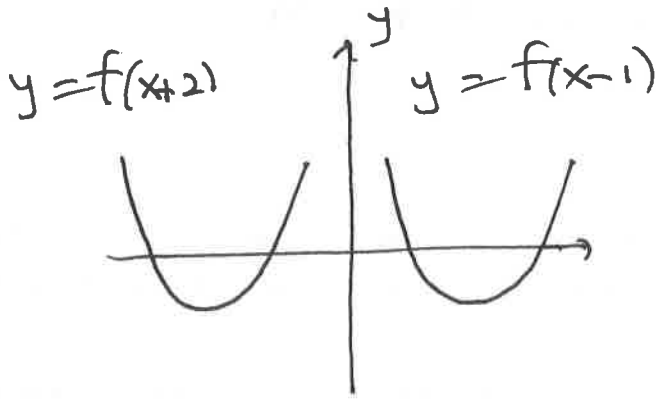
Translation (up, down)

$y = f(x) + c$





Translation (left, right)



Scaling

$y = c\,f(x)$