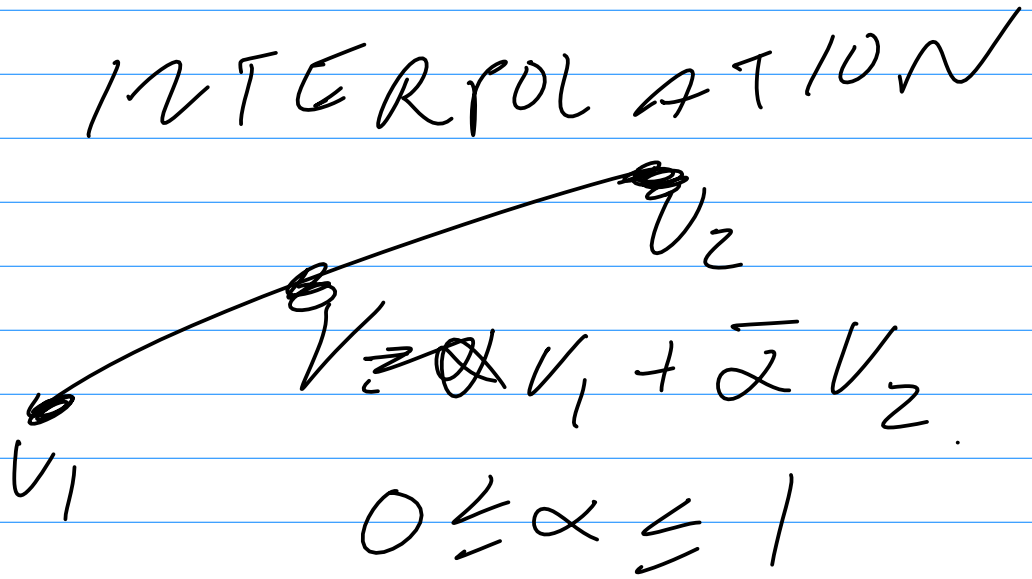
On Monday: go to EMPAC for a presentation by Eric Ameres.

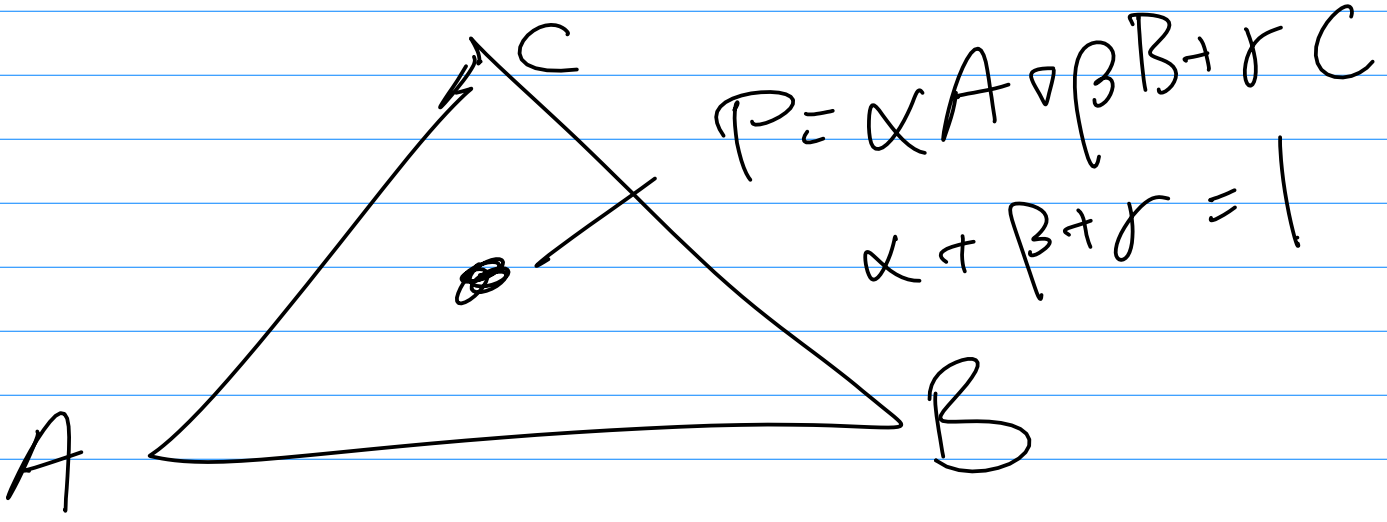
- Compression SW: Handbrake.fr Open source multiplatform.

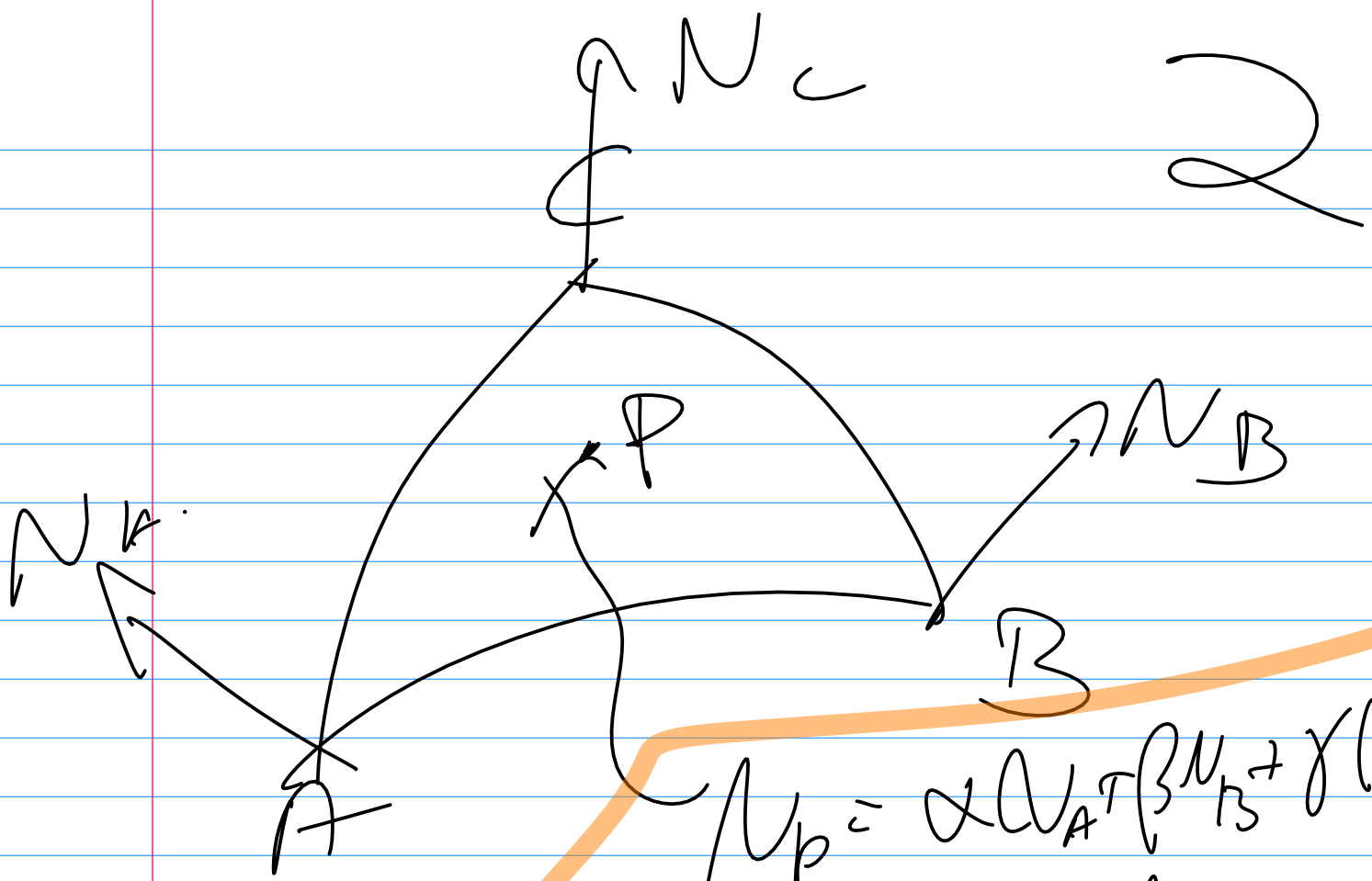
for recording, fraps is pretty good, demo is free.

Chapter 7

INTERPOLATION







$N_P = \alpha N_A + \beta N_B + \gamma N_C$

RENORMALIZE N_P.

USE N_P TO CALCULATE PHONG SHADING AT P.

ANOTHER ⟩ INTERPOLATION

INTERPOLATE ALONG EDGES, THEN ALONG SCANLINES. R/T HW.

GRAPHICS PIPELINE

PROCESS VERTICES → RASTERIZE → PROC FRAGMENTS

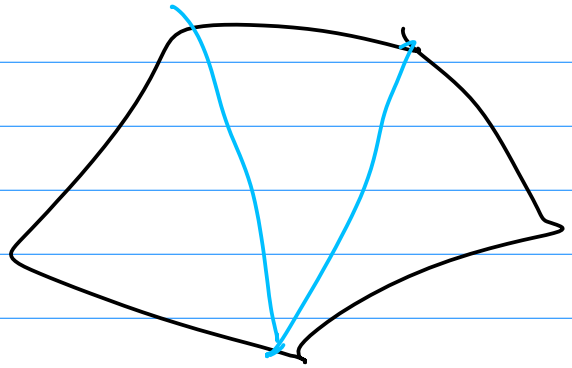
ROTATE ETC.

FIND PIXELS IN EACH △

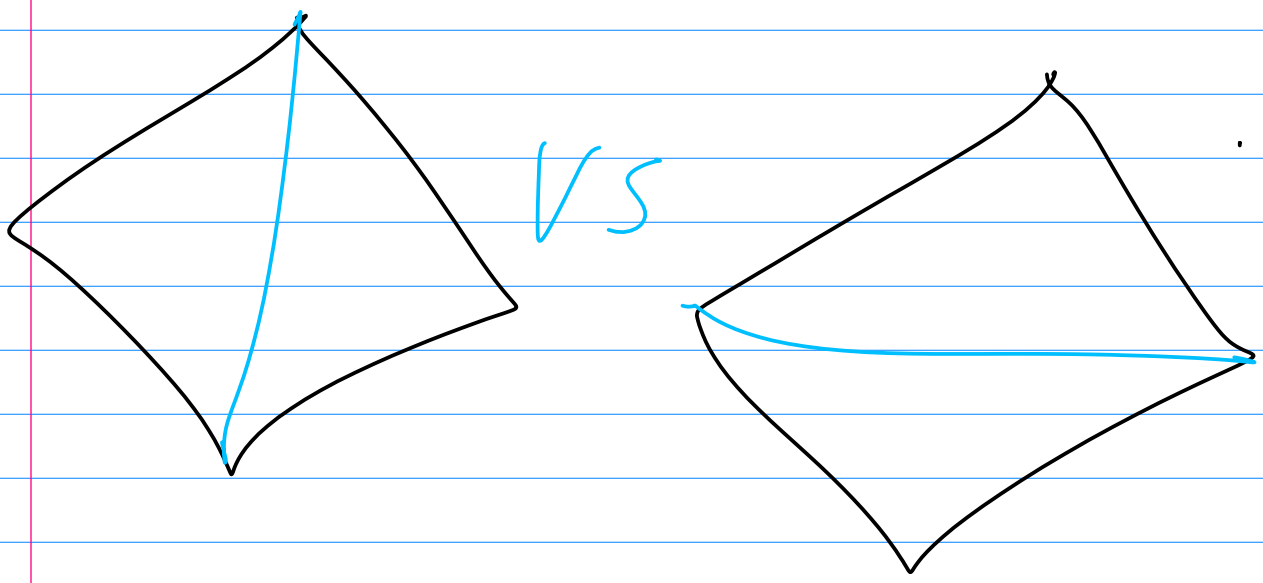
INTERPOLATION

DEPTH BUFFER AND SHADING.

TESSELATE (OR SPLIT) COMPLICATED POLYGONS INTO TRIANGLES

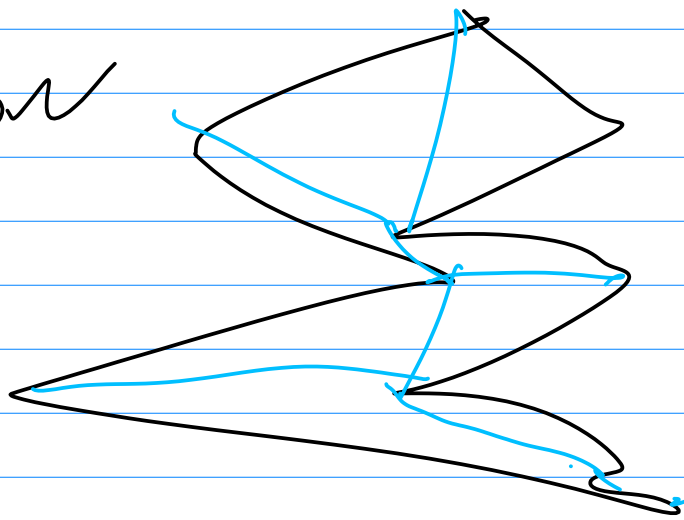


LONG THIN TRIANGLES MAY NOT SHADE WELL.



WILL SHADE DIFFERENTLY.
THIS IS A PROBLEM IN A VIDEO IF DIAGONAL CHANGES FROM FRAME TO FRAME.

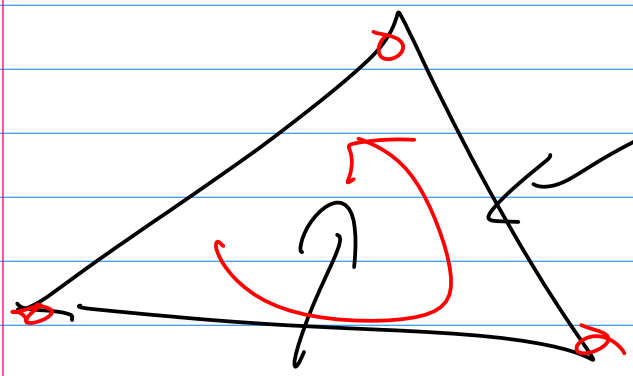
CONCAVE POLYGON TESSELATION IS HARDER



CHAPTER 9

CH 9

ORIENTATION



FRONT SIDE

BACK SIDE.
OPENGL LETS YOU COLOR THEM DIFFERENTLY

FOR A CLOSED POLYHEDRON

THE BACK FACE ARE ALL HIDDEN. CULL THEM.
THAT DELETES $\frac{1}{2}$ FACES.

NOT FOR KLEIN BOTTLES.
REF "ORIENTABILITY"

USING THIS REQUIRES THAT YOU DESIGNED OBJECT SO FACES' VERTICES ARE LISTED IN PROPER DIRECTION.

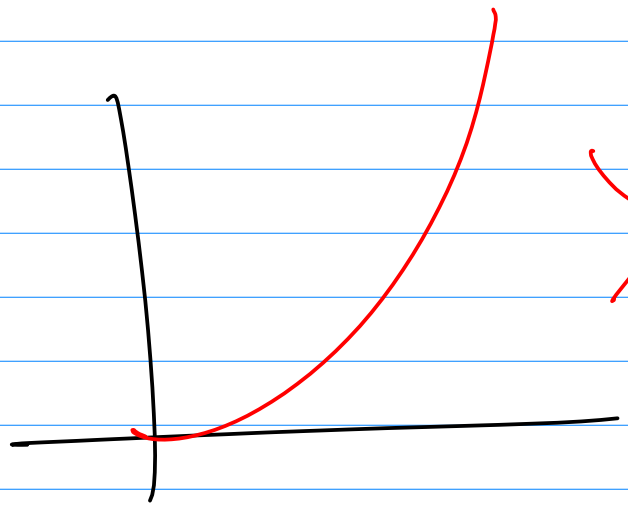
CHILD

CURVES

WORLD IS CURVED

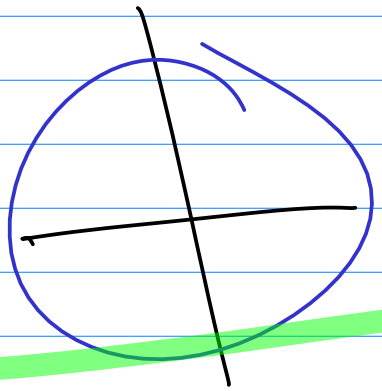
Q1: HOW SHOULD DESIGNER SPEC IT?

Q2: WHAT TYPE OF MATH SHOULD BE USED?



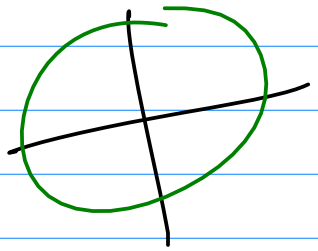
$y = x^2$

EXPLICIT



$x^2 + y^2 = 1$

IMPLICIT



$x = \sin\theta$

$y = \cos\theta$

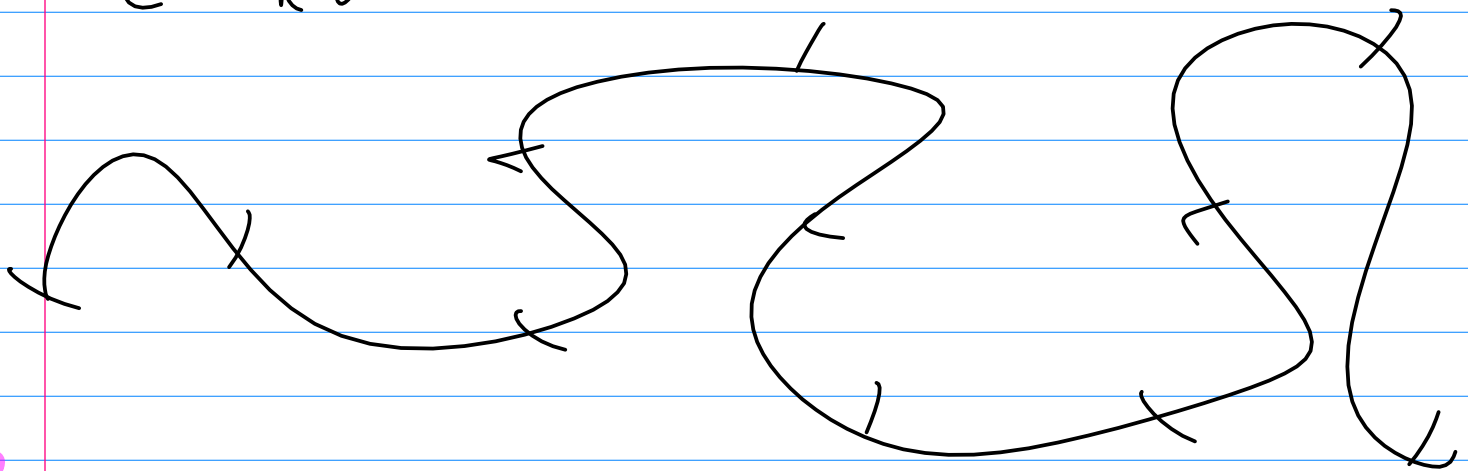
PARAMETRIC

Q3 WHAT ELEMENTARY FUNCTIONS

A. POLYNOMIALS, RATIONALS NOT SIN, COS ETC.

CIRCLE: $x = \frac{t^2-1}{t^2+1}$ $y = \frac{2t}{t^2+1}$

Q4: HOW TO HANDLE COMPLICATED CURVES



A1 HIGH DEGREE POLYNOMIAL

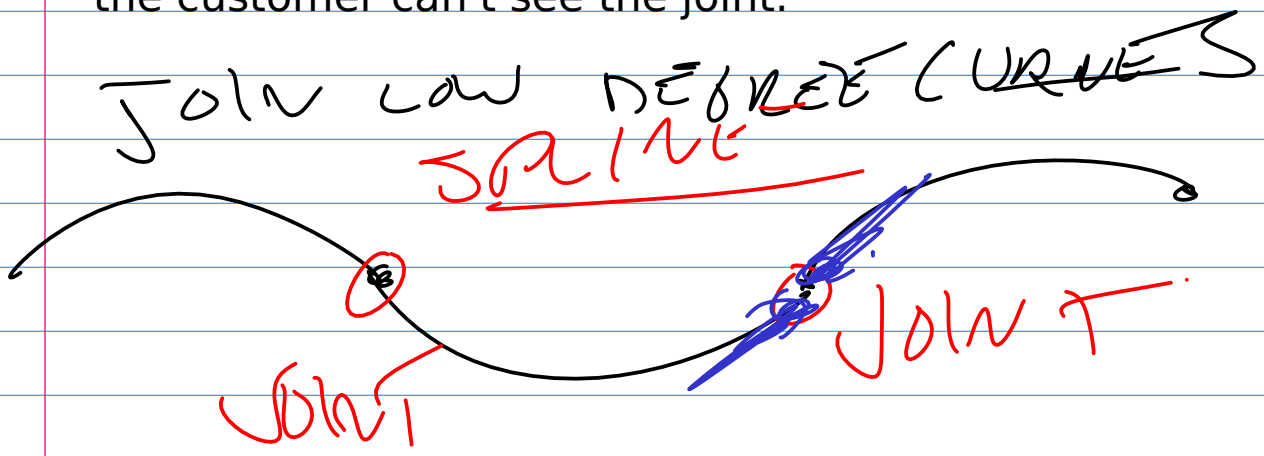
$x = \sum_{n=0}^{20} a_n t^n$

A2: CONNECT LOW DEGREE POLYNOMS

Problems with high degree polynomials
1. loss of precision during computation
2. sensitivity of curve to small changes in coefficients
3. no local control - changing any coef changes whole curve
4. not intuitive

Problems with joining many low-degree curves
1. You must make the curves meet so smoothly at joint that the customer can't see the joint.

JOIN LOW DEGREE CURVES

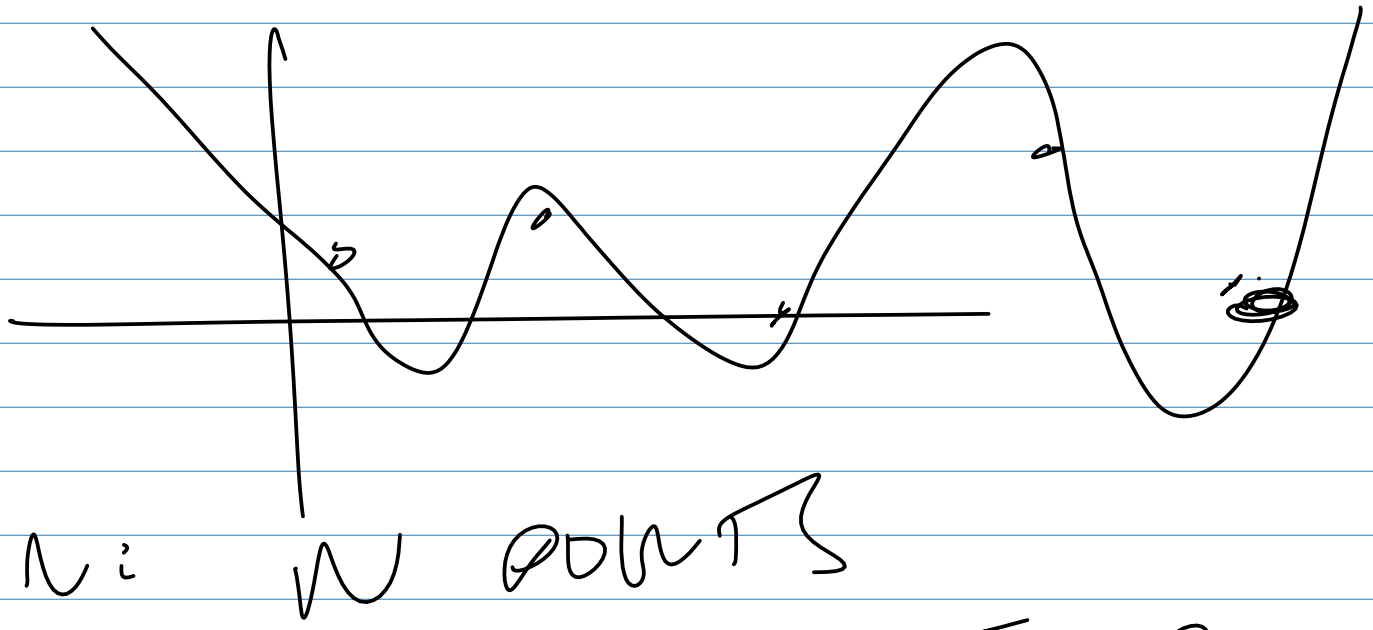


1. ENDPOINTS MEET
2. TANGENTS MATCH.
3 CURVATURES MATCH
(I'M BEING A LITTLE SLOPPY, IGNORING DIFF C^2 VS G^2)

PIECES HAVE TO BE AT LEAST CUBICS

HIGH DEGREE POLYS HAVE ISSUES

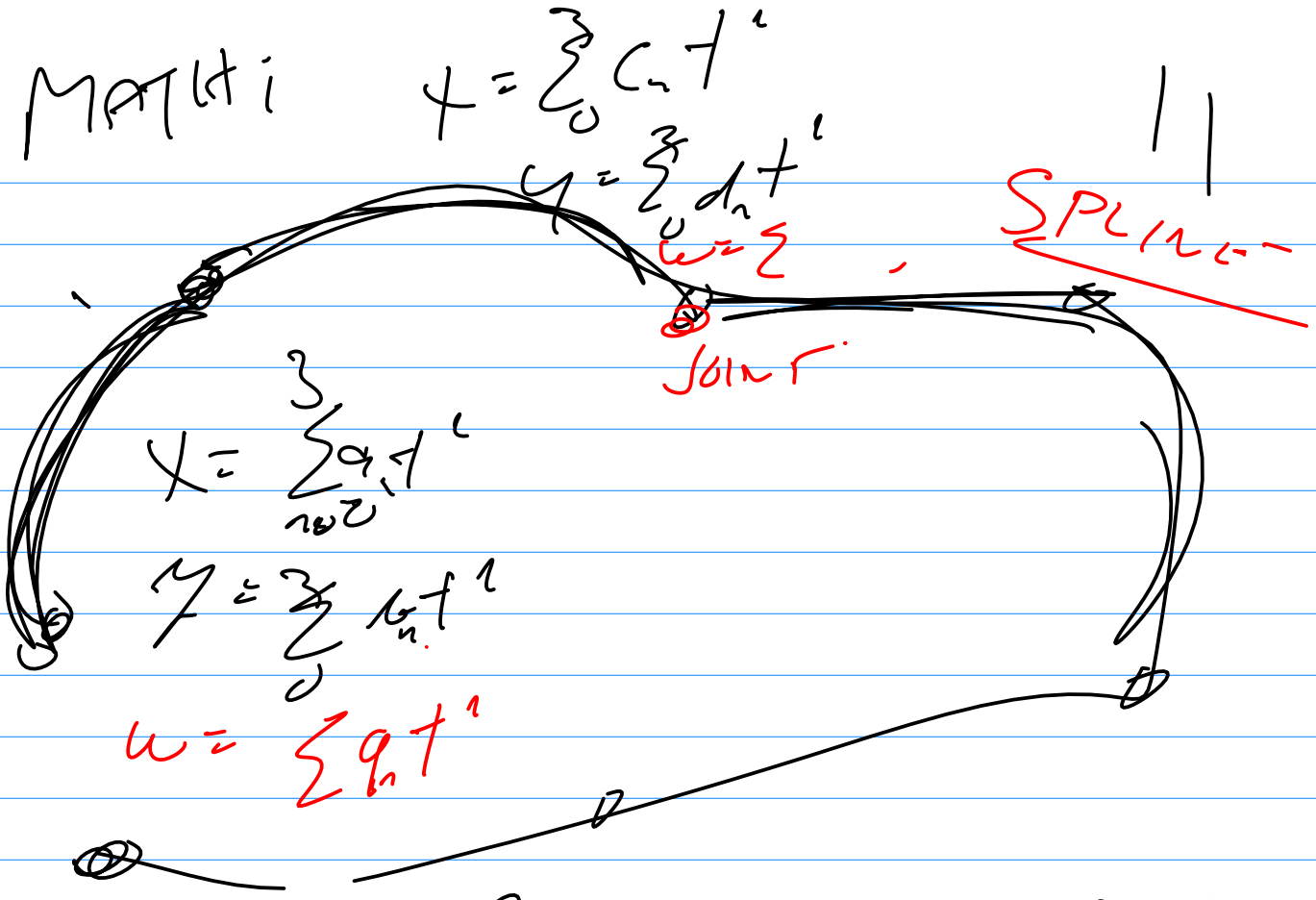
LAGRANGE INTERPOLATION.



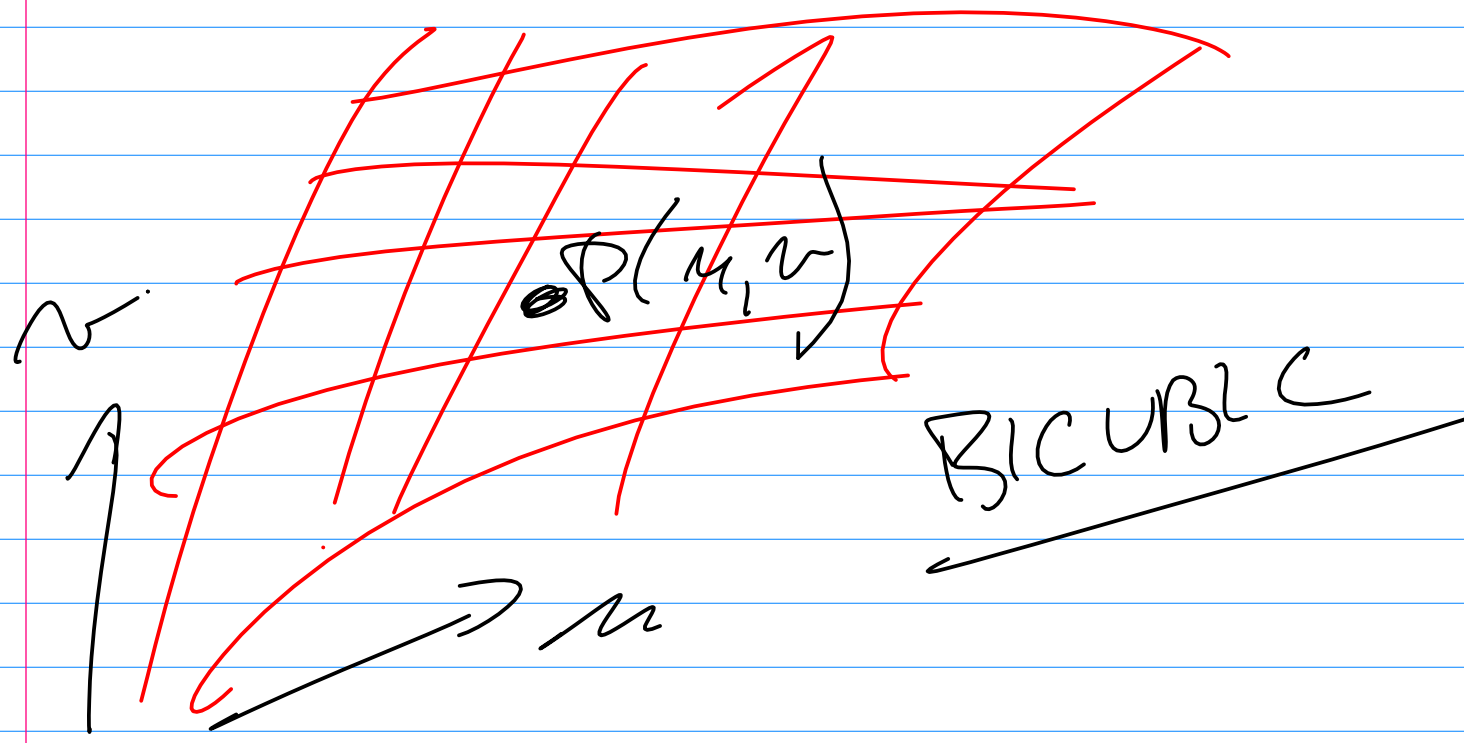
IN: N POINTS

OUT N-1 DEGREE POLY.

FOR SPLINES, DON'T GO HIGHER, USE CUBICS



SEQUENCE OF PARAMETIC CUBIC POLYNOMIALS JOINED SMOOTHLY



Q HOW TO SPEC COEFFICENTS

CUBIC PAR

$x = \sum_{i=0}^{3} a_i t^i$

$y = \sum_{i=0}^{3} b_i t^i$

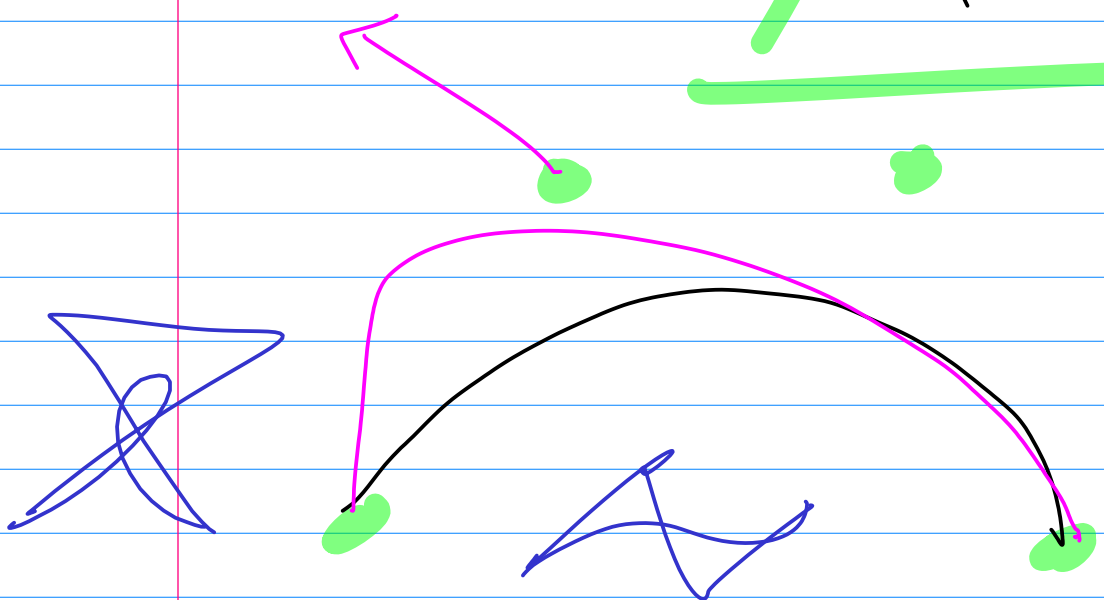
8 DOF.

USER INPUT

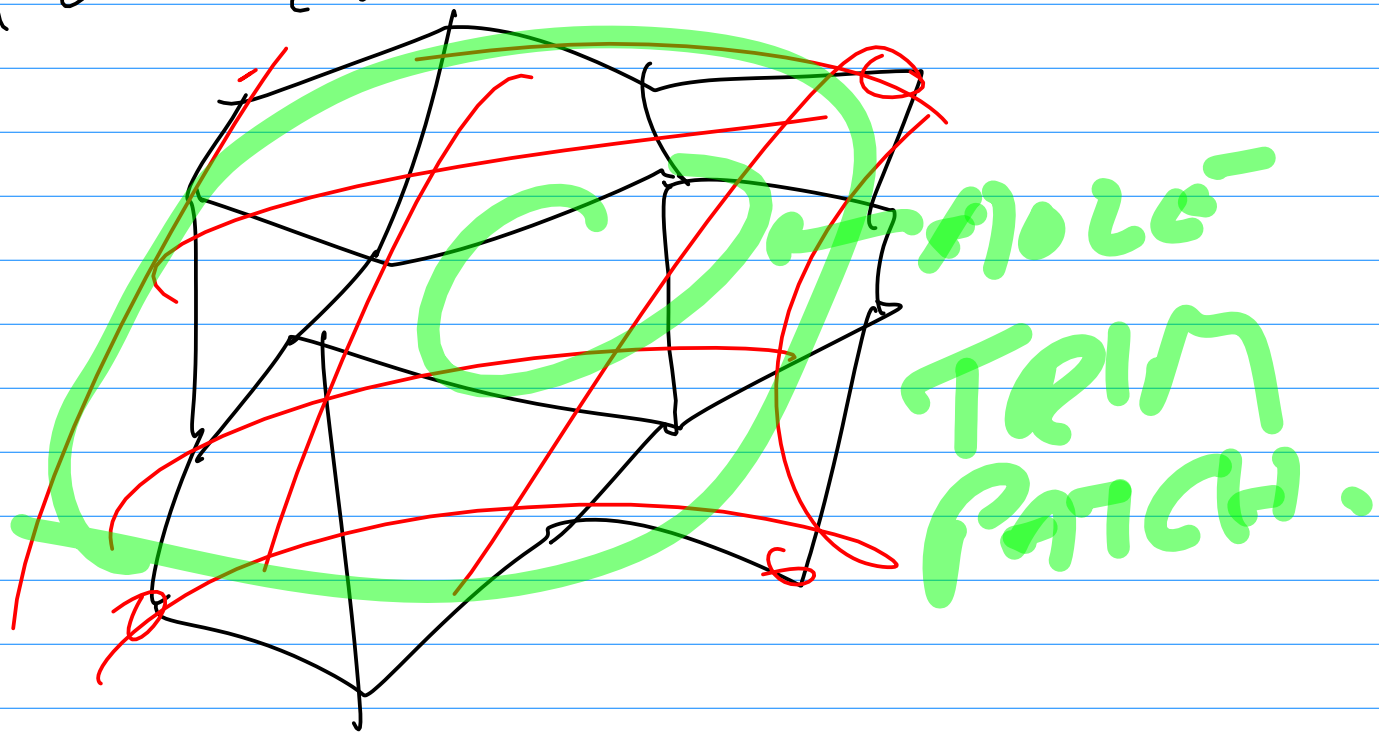
USER GIVES 4 CONTROL POINTS

8 DOF

SYSTEM COMPUTES CURVE



FOR SURFACE GIVE A MESH OF 16 CONTROL POINTS.



NEXT TIME: DETAILS EXAMPLE PROGRAM OPENGL.

BEZIER CURVE/PATCH.

DE CASTELJAU