

# Introduction to Computer Graphics.

## Objectives:

- Fundamentals of Computer Graphics algorithms
- 3D illustration and image processing (not 2D)
- Real time rendering and graphics hardware.
- OpenGL basics.
- C++.

modelling  
↓  
animation  
↓  
rendering.

## Math:

- Linear Algebra
  - Homogeneous coordinates
  - Sampling, antialiasing (Fourier analysis)
  - Monte Carlo integration
- } concrete and visual context.

Assignment 0: mesh display with OpenGL.

## Documentation of Assignment 0.

1. Correctly install vecmath library from GitHub.
2. In the makefile, change the paths of the vecmath library from the MIT server to your own system. (Note: this needs to be done in Linux).
3. Satisfy the logical requirements in the assignment (i.e. colour changing and light source shifting).

faces: "a/b/c" "d/e/f" "g/h/i"

stringstream: "a/b/c" "d/e/f" "g/h/i"

replace / by with " " (space)

and get "a b c" "d e f" "g h i"

stringstream: "a" "b" "c" ...

add to a vector: "a b c" and push to main vector

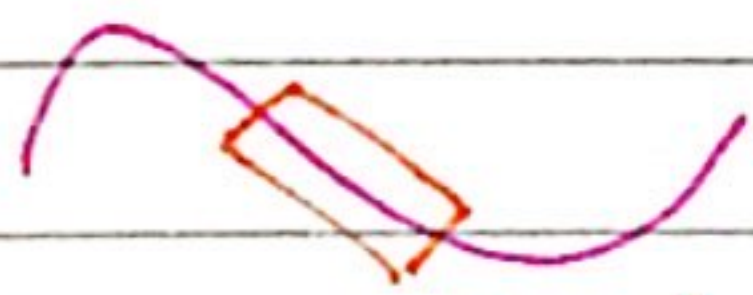


# Introduction to Computer Graphics (Lecture 2)

Building Blocks:  $\triangle$  triangles / line segments  
the graphics card can only display these two

What to do?

Create a higher representation of curves and surfaces that can easily generate triangles and line segments



line is a local representation of a curve.

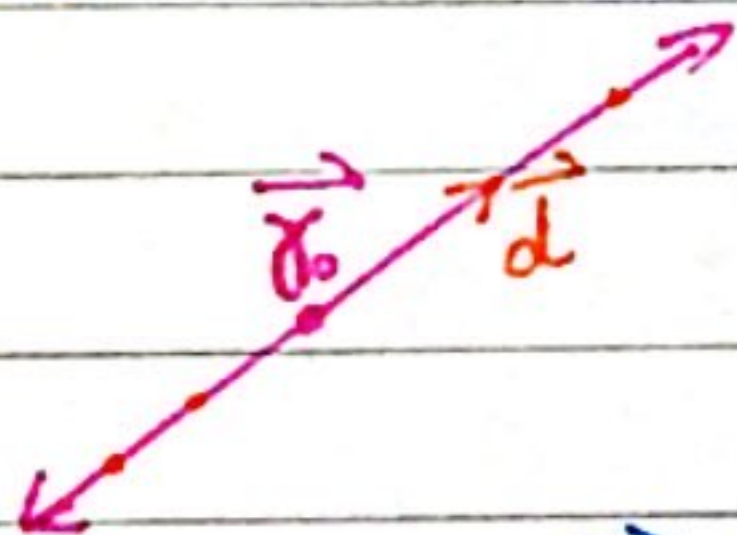


triangle is a local representation of a plane.

Why triangles?

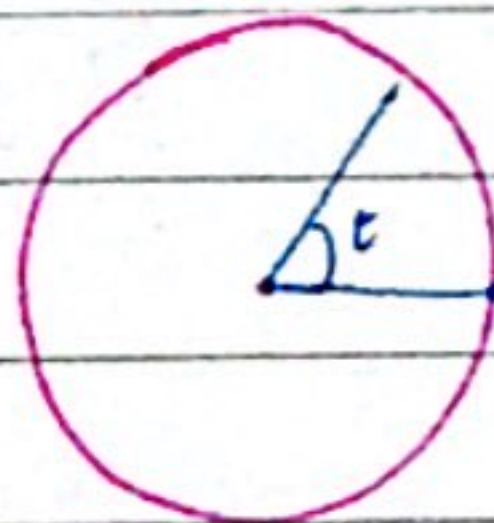
Every shape can be split into triangles. Triangles cannot be split into any shape but triangles.

## DIMENSIONS



$$\vec{r}(t) = \vec{r}_0 + \vec{d} \cdot t$$

Parameterized line



$$\vec{r}(t) = (\cos t, \sin t)$$

Parameterized circle

IMPLICIT MODELLING  $\rightarrow$  biggest issue is that you cannot have open curves, all curves need to be closed, which you cannot always have. Hence, it is good for fluid simulation and such, but not for PowerPoint or Illustrator.