



Introduction

What are you going to do here?

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Bachelor's Degree in Video Game Design
and Development



- 1 Geometry
- 2 Analytic Geometry
- 3 Subject's program
- 4 Contact info



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Geometry

The ancient greeks developed relations and logical rules to analyse figures and shapes

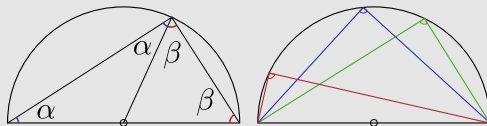
- Thales
 - Thales' Theorem
 - Thales' Interception Theorem
- Pythagoras
 - Pythagoras' Theorem
- Euclides
 - The 5 (or 10) Euclides's axioms

These are some of the most notables, but there exist many more!!



Thales' theorem

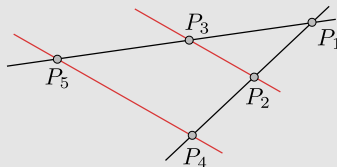
An inscribed angle in a semicircle is a right angle





Thales' intercept theorem

About the ratios of the line segments that are created if two intersecting lines are intercepted by a pair of parallels

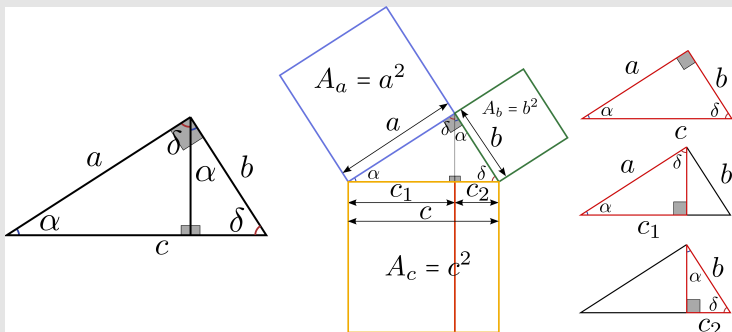


$$\frac{\overline{P_5P_3}}{\overline{P_3P_1}} = \frac{\overline{P_4P_2}}{\overline{P_2P_1}} \quad \frac{\overline{P_5P_1}}{\overline{P_3P_1}} = \frac{\overline{P_4P_1}}{\overline{P_2P_1}} = \frac{\overline{P_5P_4}}{\overline{P_3P_2}}$$



Pythagorean theorem

$$a^2 + b^2 = c^2$$





Euclid's five axioms

- A straight line segment can be drawn joining any two points
- Any straight line segment can be extended indefinitely in a straight line
- Given any straight line segment, a circle can be drawn having the segment as radius and one endpoint as center
- All right angles are congruent
- If two lines are drawn which intersect a third in such a way that the sum of the inner angles on one side is less than two right angles, then the two lines inevitably must intersect each other on that side if extended far enough. This postulate is equivalent to what is known as the parallel postulate



What's geometry?

A field in mathematics dedicated to the study of shapes, relative positions and relations between them

- **Primitives:** Are those basic entities that are necessary to describe objects such points, lines and planes. The primitives lacks of definition
- **Axioms:** Just a bunch of independent postulates which define the properties of the primitives and contains the basics for developing any geometric concept. Since they are not derivable from other postulates axioms can not be proven but they are observable

The basics of geometry claims to construct a solid base to develop further theorems and conclusions



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Analytic geometry

Descartes was the precursor of the analytic geometry

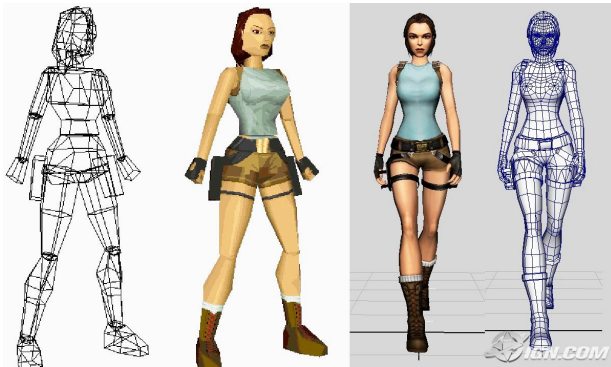
- By Defining a coordinate system, algebra and geometry could be mixed
- The principal consequence is that distances angles and other measures could be expressed as mathematical equations
- **Points**, lines and more complex shapes could be mathematically modelled
- Relative positions between this entities allows to manage the concept of views





We are mainly going to focus on points

- The primary perception of the world is based on points and the shapes that they can produce.



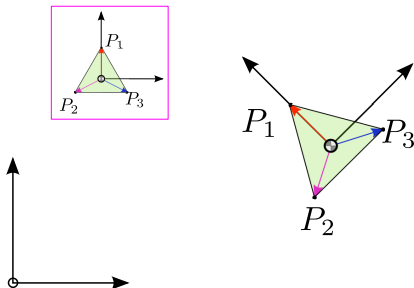


We are mainly going to focus on how to express the Pose (position + orientation) of shapes in the plane (2D) or the space (3D)





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Main objective

Understand, gain insight and get used to manipulate 2D/3D geometry

With this purpose the course is divided into **three** parts:

Part 1: General concepts on linear algebra

Part 2: Geometric transformations in 2D and 3D

Part 3: Interpolation



- Class exercises (10%)
 - At the end of the class you will receive some exercises that will be corrected by you the next day
- Lab exercises (30%)
 - Lab 1: October, 5th
 - Lab 2: November, 2nd
 - Lab 3: November, 18th
 - Lab 4: December, 7th
- Project (15%)
 - One final project. The statement will be delivered at the mid end of the course
- Exam exercises
 - Midterm (15%) from October, 24th to 28th
 - Final (30%) from January, 9th to 18th



Remember:

Wednesday

From 08:30 a.m to 10:30 a.m
@ Classroom 002

Friday

From 10:30 a.m to 12:30 a.m
@ Classroom 204



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