

In-Depth Pre-Calculus

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The aim of this course is to in-depth cover the knowledges and techniques up to the Pre-Calculus level. The connections between these materials will be emphasized, across many different topics. The advantage of doing this is to help the students make in-depth connections between the mathematics that they have learnt or will learn in different time or different courses. This has been proved to be an important factor for those students who succeed in the advanced courses. We minimize the number of formulas in this course. This is because our focus is on the understanding of the materials and the ability of comprehensively using them. See the sample topics in Section 1. Points on the plane.

1 Points on the plane

1.1 Representing Lines

Constant slope – the right way to say straight lines, Parametric equations for lines, Distance from a point to a line. Given the coordinates of the vertices of a triangle, can you find the area of the triangle?

1.2 Representing Circles

The equation of a circle, Completion of a square, Parametric equations. What do you get if you stretch a circle?

1.3 Functions

Definition of functions, Graph of a function, Composite functions (a transformation), Shifting and rescaling, Inverse function, Absolute value functions. What is the graph of $||2x + 4| - 6| + 7$?

2 Polynomials

2.1 Quadratic functions

2.2 Polynomials

3 Rational functions

4 Functions of rational exponent

5 Exponential and log functions

6 Solving equations

6.1 System of linear and non-linear equations

6.2 Polynomial equations

6.3 Rational equations

6.4 Radical equations

6.5 Exp and Log equations

6.6 Inequalities

6.7 *Graphs of inequalities

7 Sequences