



## Mathematics IV - Precalculus

<b>Department:</b> Mathematics	<b>Key of the matter:</b> 810/817
<b>Requirements:</b> Have passed mathematics III of High School Mathematics	<b>Year:</b> Second
<b>Weekly load:</b> 5	<b>Date of elaboration</b> April 2017

### Topics

#### Unit I

- 1.1. Function concept.
- 1.2. Graph of a function.
- 1.3. Representation of a function.
- 1.4. Domain and range of a function.
  - 1.4.1. Domain and range of graphic form.
  - 1.4.2. Inequalities.
  - 1.4.3. Domain of algebraic form.
- 1.5. Speed and change of a function.
- 1.6. Continuity.
- 1.7. Increasing and decreasing functions.
- 1.8. Operations with functions.
  - 1.8.1. Sum.
  - 1.8.2. Subtraction.
  - 1.8.3. Multiplication.
  - 1.8.4. Division.
  - 1.8.5. Combination of functions.
- 1.9. One-to-one functions and their inverses.
- 1.10. Absolute function.
- 1.11. Functions defined to pieces.
- 1.12. Constant function.



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## Unit II

- 2.1. Linear functions
  - 2.1.1. Form of a linear function.
  - 2.1.2. Domain and range.
  - 2.1.3. Intersections with the x axis, y axis.
  - 2.1.4. Transformations.
  - 2.1.5. Modeling with linear functions.
  - 2.1.6. Application problems.
- 2.2. Power functions.
  - 2.2.1. Power and variation functions.
  - 2.2.2. Monomial functions.
  - 2.2.3. Graph of power functions.
- 2.3. Quadratic functions.
  - 2.3.1. Form of a quadratic function.
  - 2.3.2. Domain and range.
  - 2.3.3. Intersections with the x axis, y axis.
  - 2.3.4. Transformations.
  - 2.3.5. Maximum and minimum point.
  - 2.3.6. Modeling a quadratic function.
  - 2.3.7. Application problems
- 2.4. Polynomial functions and their graphs.
  - 2.4.1. Division of polynomials (long division and synthetic division).
  - 2.4.2. Real zeros of polynomial functions.
  - 2.4.3. Fundamental theorem of algebra.

## Unidad III

- 3.1. Rational functions.
  - 3.1.1. Form of a rational function.
  - 3.1.2. Domain and range.
  - 3.1.3. Intersections with the x axis, y axis.
  - 3.1.4. Vertical, horizontal and diagonal asymptotes.
  - 3.1.5. Transformations.
  - 3.1.6. Modeling an exponential function.
  - 3.1.7. Application problems.
- 3.2. Exponential functions.
  - 3.2.1. Form of an exponential function.
  - 3.2.2. Domain and range.



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- 3.2.3. Asymptotes.
- 3.2.4. Transformations.
- 3.2.5. Modeling an exponential function.
- 3.2.6. Application problems.
- 3.3. Logarithmic functions.
  - 3.3.1. Form of a logarithmic function.
  - 3.3.2. Domain and range.
  - 3.3.3. Asymptotes.
  - 3.3.4. Transformations.
  - 3.3.5. Modeling a logarithmic function.
  - 3.3.6. Application problems.
- 3.4. Laws of logarithms.
- 3.5. Exponential and logarithmic equations.
- 3.6. Trigonometric functions.
  - 3.6.1. Form of a trigonometric function.
  - 3.6.2. Domain and range.
  - 3.6.3. Amplitude and period.
  - 3.6.4. Transformations.
  - 3.6.5. Modeling a trigonometric function.
  - 3.6.6. Application problems.



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