

## The Department of Mathematics

2019–20–A term

**Course Name** Calculus B1

**Course Number** 201.1.9141

**Course web page**

<https://www.math.bgu.ac.il/en/teaching/fall2020/courses/calculus-b1>

**Lecturer** Prof. Fedor Pakovich, <pakovich@bgu.ac.il>, Office 310

**Office Hours** <https://www.math.bgu.ac.il/en/teaching/hours>

### Abstract

### Requirements and grading<sup>1</sup>

### Course topics

1. Introduction to number theory. Intervals and segments. Concept of a function. Elementary functions. 2. Limit of a function. 3. Continuity and discontinuity of functions. 4. Derivative and differential. Basic derivatives. Differentiability and continuity. Linear approximation by differentials. High-order derivatives. The fundamental theorems of differentiation and their applications. L'Hopital's theorem and its application to calculation of limits. 5. Taylor's polynom. Expansion of functions into Taylor's and McLoran's series. Expansions of some usage functions. Application of Taylor's and McLoran's polynoms a) to approximate calculations, and b) to calculation of limits. 6. Investigation of a function. Extremal points. Necessary and sufficient conditions for extrema. Max. and min. of a function within a segment. Convexity and concavity, inflection point. Asymptotes. Graph construction. 7. Primitive function and indefinite integral. Table integrals. Calculation of indefinite integrals by decomposition, by parts, by substitution. Integration of rational and trigonometric functions. 8. Definite integrals. Reimann's sum. The fundamental theorem. Formula of Newton-Leibnitz. Calculation of definite integrals. Integration by decomposition, by parts, by substitution. 9. Use in definite integrals to calculation of areas,

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<sup>1</sup>Information may change during the first two weeks of the term. Please consult the webpage for updates



volumes and curve lengths. Rectangular and polar coordinate systems.10.  
First-order ordinary differential equations. General definitions. Cauchy  
problem. Separated variables.