

Class-11th Mathematics

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Miscellaneous Exercise on Chapter 4

Q1. Evaluate $\left[i^{18} + \left(\frac{1}{i} \right)^{25} \right]^3$

Solution:

$$\begin{aligned} \left[i^{18} + \left(\frac{1}{i} \right)^{25} \right]^3 &= \left[i^{4 \times 4 + 2} + \frac{1}{i^{4 \times 6 + 1}} \right]^3 = \left[(i^4)^4 \times i^2 + \frac{1}{(i^4)^6 \times i} \right]^3 = \left[i^2 + \frac{1}{i} \right]^3 \quad [\because i^4 = 1] \\ &= \left[-1 + \frac{1}{i} \times \frac{i}{i} \right]^3 \quad [\because i^2 = -1] \\ &= \left[-1 + \frac{i}{i^2} \right]^3 = (-1)^3 [1 + i]^3 = [-1 - i]^3 = -(1 + i) \\ &[\because (a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3] \\ &= -(1^3 + 3i + 3i^2 + i^3) = -(1 + 3i - 3 - i) \quad [\because i^2 = -1] \\ &= -(-2 + 2i) = 2 - 2i \end{aligned}$$

Q2. For any two complex numbers z_1 and z_2 , prove that $\operatorname{Re}(z_1 z_2) = \operatorname{Re} z_1 \operatorname{Re} z_2 - \operatorname{Im} z_1 \operatorname{Im} z_2$

Solution:

Let's assume $z_1 = (x_1 + iy_1)$ and $z_2 = (x_2 + iy_2)$ as two complex numbers

$$\begin{aligned} \text{So, } z_1 z_2 &= (x_1 + iy_1)(x_2 + iy_2) = x_1(x_2 + iy_2) + iy_1(x_2 + iy_2) \\ &= x_1 x_2 + ix_1 y_2 + iy_1 x_2 + i^2 y_1 y_2 = x_1 x_2 + ix_1 y_2 + iy_1 x_2 - y_1 y_2 \quad [\because i^2 = -1] \\ &= (x_1 x_2 - y_1 y_2) + i(x_1 y_2 + y_1 x_2) \end{aligned}$$

Now,

$$\operatorname{Re}(z_1 z_2) = x_1 x_2 - y_1 y_2$$

$$\operatorname{Re}(z_1 z_2) = \operatorname{Re} z_1 \operatorname{Re} z_2 - \operatorname{Im} z_1 \operatorname{Im} z_2$$

Hence, proved.

$$\left[\begin{array}{l} \text{So many students have confusion, they are unable to understand ?} \\ \text{So, conclusion is below:} \\ \text{If } z_1 = x_1 + iy_1 \\ \text{Re} = \text{Real parts is } (x_1) \text{ and Im} = \text{Imaginary parts is } (y_1) \\ \text{Now, } z_1 z_2 = (x_1 x_2 - y_1 y_2) + i(x_1 y_2 + x_2 y_1) \\ \text{here: Real part Re} = (x_1 x_2 - y_1 y_2) \text{ and Imaginary part Im} = (x_1 y_2 + x_2 y_1) \\ \text{So, } \operatorname{Re}(z_1 z_2) = \operatorname{Re} z_1 \operatorname{Re} z_2 - \operatorname{Im} z_1 \operatorname{Im} z_2 \end{array} \right]$$

Miscellaneous Exercise On Chapter Solution

Henry Sinclair Hall



Miscellaneous Exercise On Chapter Solution:

Boundary Value Problems David L. Powers, 2006 Preface Chapter 0 Ordinary Differential Equations Chapter 1 Fourier Series and Integrals Chapter 2 The Heat Equation Chapter 3 The Wave Equation Chapter 4 The Potential Equation Chapter 5 Higher Dimensions Other Coordinates **Calculus - Preliminary Edition, Student Solutions Manual** Deborah Hughes-Hallett, Andrew M. Gleason, Sheldon P. Gordon, David O. Lomen, William G. McCallum, Brad G. Osgood, Andrew Pasquale, Jeff Tecosky-Feldman, Joe B. Thrash, Karen R. Thrash, Thomas W. Tucker, 1992-08-19 Designed to promote an actual understanding of calculus as well as a real sense of how math is used in our technological age At every stage it stresses the meaning in practical graphical or numerical terms of the symbols students are using and the main concepts of calculus are described in plain English Differential equations exponential functions the definite integral and its applications are among the topics covered Includes problem sets many of which are open ended *Differential-Difference Equations* Bellman, 1963-01-01 Differential Difference Equations *Algebra for College Students* Mark Dugopolski, 1991 The unifying theme of this text is the development of the skills necessary for solving equations and inequalities followed by the application of those skills to solving applied problems Every section ending in the text begins with six simple writing exercises These exercises are designed to get students to review the definitions and rules of the section before doing more traditional exercises **A Complete Algebra to Accompany Ray's Series of Mathematics** George W. Smith, 1890 Plane Trigonometry Edward Rutledge Robbins, 1909 **Jharkhand Board NCERT Mathematics Class 11** Dr. Ram Dev Sharma, Er. Meera Goyal, 2023-10-17 Unit I Sets and Functions 1 Sets 2 Relations and Functions 3 Trigonometric Functions Unit II Algebra 4 Principle of Mathematical Induction 5 Complex Numbers and Quadratic Equations 6 Linear Inequalities 7 Permutations and Combinations 8 Binomial Theorem 9 Sequences and Series Unit III Co ordinate Geometry 10 Straight Lines 11 Conic Sections 12 Introduction to Three Dimensional Geometry Unit IV Calculus 13 Limits and Derivatives Unit V Mathematical Reasoning 14 Mathematical Reasoning Unit VI Statistics Probability 15 Statistics 16 Probability Value Based Questions VBQ Board Examination Papers **Mathematics in Science and Engineering**, 1970 **Intermediate Algebra** Mark Dugopolski, 1991 Intermediate Algebra is designed to provide your students with the algebra background needed for further college level mathematics courses The unifying theme of this text is the development of the skills necessary for solving equations and inequalities followed by the application of those skills to solving applied problems The primary goal in writing the third edition of Intermediate Algebra has been to retain the features that made the second edition so successful while incorporating the comments and suggestions of second edition users Many new features have been provided that will help instructors reach the goals that they have set for their students As always the author endeavors to write texts that students can read understand and enjoy while gaining confidence in their ability to use mathematics **Algebra for Beginners** Charles Godfrey, Arthur Warry Siddons, 1912 Elementary Differential Equations: Principles,

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Higher Forms of Schools William Thomas Boone, 1918 **Longmans' School Mensuration** Alfred John Pearce, 1897
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