Question 5

(a)   If $y = \left(\cot^{-1} x \right)^2$, show that $\left(1 + x^2\right)^2 \dfrac{d^2 y}{dx^2} + 2x\left(1 + x^2\right)\dfrac{dy}{dx} = 2$ [5]

(b)   Find the maximum volume of the cylinder which can be inscribed in a sphere of   [5]
radius $3\sqrt{3}$ cm . (Leave the answer in terms of π)

Question 6

(a)   Evaluate: $\displaystyle\int \dfrac{\cos^{-1} x}{x^2} \, dx$ [5]

(b)   Find the area bounded by the curve $y = 2x - x^2$, and the line $y = x$.   [5]

Question 7

(a)   Find the Karl Pearson's co-efficient   of correlation between x and y for the   [5]
following data:

x	16	18	21	20	22	26	27	15
y	22	25	24	26	25	30	33	14

(b)   The following table shows the mean and standard deviation of the marks of   [5]
Mathematics and Physics scored by the students in a school:

	Mathematics	Physics
Mean	84	81
Standard Deviation	7	4

The correlation co-efficient between the given marks is 0·86.   Estimate the likely
marks in Physics if the marks in Mathematics are 92.

Question 8

(a)   Bag A contains three red and four white balls; bag B contains two red and three   [5]
white balls. If one ball is drawn from bag A and two balls from bag B, find the
probability that:

(i)   One ball is red and two balls are white;

(ii)   All the three balls are of the same colour.

3

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Carrion Ecology, Evolution, and Their Applications M. Eric Benbow,Jeffery K. Tomberlin,Aaron M. Tarone,2025-07-17 The first edition of Carrion Ecology Evolution and Their Applications brought together multiple scientific disciplines to shed light on the importance of carrion within the context of ecology and evolutionary biology and through applications ranging from human mass disasters to habitat ecosystem conservation This second edition builds upon this foundation to include a huge amount of new research consisting of 33 chapters 9 brand new and the remaining 24 substantially updated and expanded One of the most significant changes for this edition is the coverage of aquatic ecosystems both freshwater and marine The book is now represented by 73 authors from eight countries incorporating more diverse perspectives and engagement into this multidisciplinary and expanding science The resulting new edition showcases a broader scope of topics geographic areas ecosystems and history of carrion ecology evolution and their applications for humanity It provides the most comprehensive resource on carrion from all ecosystems of the world The student academic and professional will find this book insightful providing new insights for the fields of molecular ecology microbiology entomology population biology community and ecosystem ecology as well as applications in forensics and human and environmental health *Applications of STEM (Science, Technology, Engineering and Mathematics) Tools in Microbiology of Infectious Diseases* Julio Alvarez,Andres Perez,2017-06-02 Epidemiology is a discipline intended to systematically investigate and ideally quantify disease dynamics in populations Perez 2015 Epidemiological assessmentsmay be divided into four large areas namely a identification and characterization of a pathogen b development of systems for detection of cases c descriptive epidemiology and quantification of disease patterns and d advanced analytical methods to design intervention strategies Briefly there is an initial need for understanding the pathogeny of a disease and condition which may also include experimental studies and development of new models of infection and proliferation under different conditions Subsequently such knowledgemay be applied to support the identification of cases which typically includes the design evaluation and validation of diagnostic tests Diseasemay then be quantified in a population leading to the identification of patterns and application of molecular characterization techniques to understand disease spread and ultimately to identify factors preventing or promoting disease Finally those factors may be incorporated into advanced quantitative methods and epidemiological models which are used to design and evaluate strategies aimed at preventing controlling or eliminating disease in the population Recent years have seen a dramatic increase in the application of science technology engineering and mathematical STEM tools and approaches intended to enhance such analytical epidemiology process with the ultimate goal of supporting disease prevention control and eradication This eBook comprises a series of research articles that through current state of the art scientific knowledge on the application of STEM tools to the microbiology of infectious diseases demonstrate their usefulness at the various components of an integral epidemiological approach divided into the four large components of a experimental studies b novel

diagnostic techniques c epidemiological characterization and d population modeling and intervention **Advanced Remote Sensing for Urban and Landscape Ecology** Sk. Mustak,Dharmaveer Singh,Prashant Kumar Srivastava,2023-06-23 This book introduces the use of various remote sensing data such as microwave hyperspectral and very high resolution VHR satellite imagery mapping techniques including pixel and object based machine learning and geostatistical modelling techniques including cellular automation entropy and land fragmentation Remote sensing plays a vital role in solving urban and environmental challenges at the landscape level Globally more than half of the urban population is facing severe environmental and social challenges especially those relating to climate change agricultural land encroachment green infrastructure and environmental degradation mobility due to rapid rural urban transformation and anthropogenic interventions Mapping and quantification of such threats at the landscape level are challenging for experts using traditional techniques however remote sensing technology provides diverse spatial data at a varying scale volume and accessibility for mapping and modelling and it also analyses challenges at urban and landscape levels Together they address challenges at urban and landscape levels to support the Sustainable Development Goals SDGs *Women in conservation and restoration ecology 2022* Diana Hamilton,Myriam A. Barbeau,Isabel Marques,Clare Morrison,Alienor Chauvenet,2024-04-30 **Future Oceans Under Multiple Stressors: From Global Change to Anthropogenic Impact** Erik Olsen,Isaac C. Kaplan,Cecilie Hansen Eide,Elizabeth A. Fulton,Michael J. Fogarty,Jamie C. Tam,Saskia Anna Otto,2020-12-30 This eBook is a collection of articles from a Frontiers Research Topic Frontiers Research Topics are very popular trademarks of the Frontiers Journals Series they are collections of at least ten articles all centered on a particular subject With their unique mix of varied contributions from Original Research to Review Articles Frontiers Research Topics unify the most influential researchers the latest key findings and historical advances in a hot research area Find out more on how to host your own Frontiers Research Topic or contribute to one as an author by contacting the Frontiers Editorial Office frontiersin org about contact Current Trends in Dynamical Systems in Biology and Natural Sciences Maira Aguiar,Carlos Braumann,Bob W. Kooi,Andrea Pugliese,Nico Stollenwerk,Ezio Venturino,2020-05-06 This book disseminates the latest results and envisages new challenges in the application of mathematics to various practical situations in biology epidemiology and ecology It comprises a collection of the main results presented at the Ninth Edition of the International Workshop Dynamical Systems Applied to Biology and Natural Sciences DSABNS held from 7 to 9 February 2018 at the Department of Mathematics University of Turin Italy While the principal focus is ecology and epidemiology the coverage extends even to waste recycling and a genetic application The topics covered in the 12 peer reviewed contributions involve such diverse mathematical tools as ordinary and partial differential equations delay equations stochastic equations control and sensitivity analysis The book is intended to help both in disseminating the latest results and in envisaging new challenges in the application of mathematics to various practical situations in biology epidemiology and ecology **Symmetry and Exact Solutions of Nonlinear Mathematical Physics**

Equations Gangwei Wang,Xiangpeng Xin ,Samir A. El-Tantawy,2024-08-13 Nonlinear problems originating from applied science that is closely related to practices contain rich and extensive content It makes the corresponding nonlinear models also complex and diverse Due to the intricacy and contingency of nonlinear problems unified mathematical methods still remain far and few between In this regard the comprehensive use of symmetric methods along with other mathematical methods becomes an effective option to solve nonlinear problems   Why Women Will Save the Planet Friends of the Earth,C40 Cities,2018-03-01 Big cities don t have to mean a dystopian future They can be turned around to be powerhouses of well being and environmental sustainability if we empower women This book is a unique collaboration between C40 and Friends of the Earth showcasing pioneering city mayors key voices in the environmental and feminist movements and academics The essays collectively demonstrate both the need for women s empowerment for climate action and the powerful change it can bring A rallying call for the planet for women for everyone   Advanced Information and Computer Technology in Engineering and Manufacturing, Environmental Engineering M.L. Li,G.W. Zhang,2013-09-04 Selected peer reviewed papers from the 2013 International Conference on Advances in Materials Science and Manufacturing Technology AMSMT 2013 May 18 19 2013 Xiamen Fujian China   *Canadian Journal of Fisheries and Aquatic Sciences* ,2013   Wildlife Research ,2013   **The National Union Catalogs, 1963-** ,1964   University of California Union Catalog of Monographs Cataloged by the Nine Campuses from 1963 Through 1967: Authors & titles University of California (System). Institute of Library Research,University of California, Berkeley,1972   The National union catalog, 1968-1972 ,1973   **National E-mail and Fax Directory** ,1998   **Papers on Mathematical Ecology** ,1986   **Associations' Publications in Print** ,1981 1981 in 2 v v 1 Subject index v 2 Title index Publisher title index Association name index Acronym index Key to publishers and distributors abbreviations   **Subject Guide to Books in Print** ,1993   **National Union Catalog** ,1968 Includes entries for maps and atlases   *Mathematical Reviews* American Mathematical Society,1981

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