

Exercises: Double and Triple Integrals
Solutions
Math 13, Spring 2010

1. Consider the iterated integral

$$\int_0^1 \int_0^{1-x^2} \int_0^{1-x} f(x, y, z) dy dz dx.$$

(a) Rewrite this integral as an equivalent iterated integral in the order $dy dx dz$.

(b) Rewrite the integral in the order $dz dx dy$.

Solution. The triple integral is an integral over the solid W in \mathbb{R}^3 that consists of all points (x, y, z) with

$$\begin{aligned} 0 &\leq x \leq 1 \\ 0 &\leq z \leq 1 - x^2 \\ 0 &\leq y \leq 1 - x. \end{aligned}$$

To obtain the $dy dx dz$ integral we only need to change the order of the two outer integrals, which involves studying the “shadow” of W as a region D in the xz -plane. This region D consists of points (x, z) with

$$\begin{aligned} 0 &\leq x \leq 1 \\ 0 &\leq z \leq 1 - x^2. \end{aligned}$$

If you draw a diagram of this region, you see that it can also be described as

$$\begin{aligned} 0 &\leq z \leq 1 \\ 0 &\leq x \leq \sqrt{1-z}. \end{aligned}$$

This is sufficient to re-write the triple integral as

$$\int_0^1 \int_0^{\sqrt{1-z}} \int_0^{1-x} f(x, y, z) dy dx dz.$$

In order to get the $dz dx dy$ integral we need to analyze the three dimensional solid W , by sketching a diagram. Because the two outer integrals are $dx dy$, we then need to project W to find its shadow onto the xy -plane. It turns out that this shadow in the xy plane is the region bounded by the triangle with vertices $(0,0)$, $(1,0)$ and $(0,1)$.

Exercises Double And Triple Integrals Solutions Math 13

Simone Malacrida



Exercises Double And Triple Integrals Solutions Math 13:

Student Solutions Manual to accompany Advanced Engineering Mathematics Warren S. Wright, 2010-06-24

Exercises of Double and Triple Integrals Simone Malacrida, 2023-04-21 In this book exercises are carried out regarding the following mathematical topics double integrals triple integrals Initial theoretical hints are also presented to make the performance of the exercises understandable **Advanced Calculus: Fundamentals of Mathematics** Carlos Polanco, 2019-07-31 Vector calculus is an essential mathematical tool for performing mathematical analysis of physical and natural phenomena It is employed in advanced applications in the field of engineering and computer simulations This textbook covers the fundamental requirements of vector calculus in curricula for college students in mathematics and engineering programs Chapters start from the basics of vector algebra real valued functions different forms of integrals geometric algebra and the various theorems relevant to vector calculus and differential forms Readers will find a concise and clear study of vector calculus along with several examples exercises and a case study in each chapter The solutions to the exercises are also included at the end of the book This is an ideal book for students with a basic background in mathematics who wish to learn about advanced calculus as part of their college curriculum and equip themselves with the knowledge to apply theoretical concepts in practical situations Mathematics for Secondary School Teachers Elizabeth G. Bremigan, Ralph J. Bremigan, John D. Lorch, 2011 Mathematics for Secondary School Teachers discusses topics of central importance in the secondary school mathematics curriculum including functions polynomials trigonometry exponential and logarithmic functions number and operation and measurement Acknowledging diversity in the mathematical backgrounds of pre service teachers and in the goals of teacher preparation programs the authors have written a flexible text through which instructors can emphasize any of the following Basics exploration of key pre college topics from intuitive and rigorous points of view Connections exploration of relationships among topics using tools from college level mathematics Extensions exploration of college level mathematical topics that have a compelling relationship to pre college mathematics Mathematics for Secondary School Teachers provides a balance of discovery learning and direct instruction Activities and exercises address the range of learning objectives appropriate for future teachers Beyond the obvious goals of conceptual understanding and computational fluency readers are invited to devise mathematical explanations and arguments create examples and visual representations remediate typical student errors and misconceptions and analyze student work Introductory discussion questions encourage prospective teachers to take stock of their knowledge of pre college topics A rich collection of exercises of widely varying degrees of difficulty is integrated with the text Activities and exercises are easily adapted to the settings of individual assignments group projects and classroom discussions Mathematics for Secondary School Teachers is primarily intended as the text for a bridge or capstone course for pre service secondary school mathematics teachers It can also be used in alternative licensure programs as a supplement to a mathematics methods

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