MA205 Lesson 22

Lesson 21 - Estimations Using Data and Functions I

Monday, September 24, 2007

Outline

1. Questions From Lesson 20, Functions of Several Variables
   - Functions of Several Variables
2. Estimations Using Data and Functions
   - Double Riemann Sums and Double Integrals
   - Midpoint Rule and Average Value
3. Look at for Next Time

Outline

1. Questions From Lesson 20, Functions of Several Variables
   - Functions of Several Variables
2. Estimations Using Data and Functions
   - Double Riemann Sums and Double Integrals
   - Midpoint Rule and Average Value
3. Look at for Next Time

Functions of Several Variables

- Think of a room with the left corner as the origin. Look at pages 793-796

Functions of Several Variables

- Domain and Range and their nomenclature

Functions of Several Variables

- Checking your comprehension! Do Problem 5. from Stewart Text Page 898 on the board.

Outline

1. Questions From Lesson 20, Functions of Several Variables
   - Functions of Several Variables
2. Estimations Using Data and Functions
   - Double Riemann Sums and Double Integrals
   - Midpoint Rule and Average Value
3. Look at for Next Time

Double Riemann Sums and Double Integrals

1. $R = [a, b]X[c, d] = \{(x, y) \in \mathbb{R}^2 | a \leqslant x \leqslant b, c \leqslant y \leqslant d\}$

Double Riemann Sums and Double Integrals

1. $R = [a, b]X[c, d] = \{(x, y) \in \mathbb{R}^2 | a \leqslant x \leqslant b, c \leqslant y \leqslant d\}$
2. $S = \{(x, y, z) \in \mathbb{R}^3 | 0 \leqslant z \leqslant f(x, y), (x, y) \in R\}$

Double Riemann Sums and Double Integrals

1. $R = [a, b]X[c, d] = \{(x, y) \in \mathbb{R}^2 | a \leqslant x \leqslant b, c \leqslant y \leqslant d\}$
2. $S = \{(x, y, z) \in \mathbb{R}^3 | 0 \leqslant z \leqslant f(x, y), (x, y) \in R\}$
3. Now we make rectangles each with area $\Delta A = \Delta x \Delta y$.

Double Riemann Sums and Double Integrals

1. $R = [a, b]X[c, d] = \{(x, y) \in \mathbb{R}^2 | a \leqslant x \leqslant b, c \leqslant y \leqslant d\}$
2. $S = \{(x, y, z) \in \mathbb{R}^3 | 0 \leqslant z \leqslant f(x, y), (x, y) \in R\}$
3. Now we make rectangles each with area $\Delta A = \Delta x \Delta y$.
4. We chose sample points and get $f(x_{ij}^*, y_{ij}^*)\Delta A$

Double Riemann Sums and Double Integrals

1. $R = [a, b]X[c, d] = \{(x, y) \in \mathbb{R}^2 | a \leqslant x \leqslant b, c \leqslant y \leqslant d\}$
2. $S = \{(x, y, z) \in \mathbb{R}^3 | 0 \leqslant z \leqslant f(x, y), (x, y) \in R\}$
3. Now we make rectangles each with area $\Delta A = \Delta x \Delta y$.
4. We chose sample points and get $f(x_{ij}^*, y_{ij}^*)\Delta A$
5. Next we set up Riemann Sums
$$V = \lim_{m,n\to\infty} \sum_{i=1}^{m} \sum_{j=1}^{n} f(x_{ij}^*, y_{ij}^*)\Delta A$$

Double Riemann Sums and Double Integrals

1. $R = [a, b]X[c, d] = \{(x, y) \in \mathbb{R}^2 | a \leqslant x \leqslant b, c \leqslant y \leqslant d\}$
2. $S = \{(x, y, z) \in \mathbb{R}^3 | 0 \leqslant z \leqslant f(x, y), (x, y) \in R\}$
3. Now we make rectangles each with area $\Delta A = \Delta x \Delta y$.
4. We chose sample points and get $f(x_{ij}^*, y_{ij}^*)\Delta A$
5. Next we set up Riemann Sums
$$V = \lim_{m,n\to\infty} \sum_{i=1}^{m} \sum_{j=1}^{n} f(x_{ij}^*, y_{ij}^*)\Delta A$$
6. Finally we get the double integral
$$\int\int_R f(x, y)dA = \lim_{m,n\to\infty} \sum_{i=1}^{m} \sum_{j=1}^{n} f(x_{ij}^*, y_{ij}^*)\Delta A$$

Outline

1. Questions From Lesson 20, Functions of Several Variables
   - Functions of Several Variables
2. Estimations Using Data and Functions
   - Double Riemann Sums and Double Integrals
   - Midpoint Rule and Average Value
3. Look at for Next Time

Midpoint Rule and Average Value

Look in the book

Estimations using Defined Functions

- Estimations using Defined Functions.

Questions