MA153 Lesson 15

LESSON 15 - Limits and Continuity

17 September, 2008

Outline

1. Admin
2. Last Class
   - Last Class Homework Help
3. Limits and Continuity
   - Course Guide
   - Definition of Limit
   - Definitions of Continuity
   - Homework Help
4. Look Forward

Admin

1. Homework 3 is posted and due 22 September - Next Monday

Admin

2. Project Questions - Teams?

Admin

3. Bonus for attendance of Friday's Talk

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Homework Help

Questions? - Homework Help

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1. Understand the idea of points being ”close” in $\mathbb{R}^2$ and $\mathbb{R}^3$.
2. Determine the limit of a function of two variables.
3. Determine whether a function of two variables is continuous at a point.
4. Understand the different behavior possible when determining limits and continuity for a multi-variable function.
5. HOMEWORK PROBLEMS: 4, 8, 16, 29

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Limit

1. $$\lim_{(x,y)\to(a,b)} f(x,y) = L$$

Limit

2. If $f(x, y) \to L_1$ as $(x, y) \to (a, b)$ along the path C_1 and $f(x, y) \to L_2$ as $(x, y) \to (a, b)$ along a path C_2, were $L_1 \neq L_2$, then the $\lim_{(x,y)\to(a,b)} f(x, y)$ does not exist.

Limit

3. What does that mean?

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Continuity

A function f of two variables is called **continuous at** (a, b) if

Continuity

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$$\lim_{(x,y)\to(a,b)} f(x, y) = f(a, b)$$

Continuity

A function f of two variables is called **continuous at** (a, b) if

$$\lim_{(x,y)\to(a,b)} f(x, y) = f(a, b)$$

We say f is **continuous on** D if f is continuous at every point (a, b) in D.

Continuity

This means that if the point (x, y) changes by a small amount

Continuity

This means that if the point (x, y) changes by a small amount then the value of $f(x, y)$ changes by a small amount.

Continuity

This means that if the point (x, y) changes by a small amount then the value of $f(x, y)$ changes by a small amount. So the graph has no holes or jumps.

Continuity of Polynomials and Rational Functions

1. Polynomials are continuous.

Continuity of Polynomials and Rational Functions

2. Rational functions are ratios of two polynomials and so they are continuous as long as they are on their domain.

Board Work

Mathematica can help us a lot
First let us talk through 14.2.2 pg 877

Board Work

14.2.20
14.2.36
14.2.39

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Homework Help

Look Forward

Partial Derivatives - 14.3

1. Understand the meaning of f_x and f_y both analytically and geometrically.
2. Understand the various notations for f_x and f_y.
3. Determine the first and second partial derivatives of a function of two or more variables.
4. Become familiar with Laplace's equation and harmonic functions.
5. HOMEWORK PROBLEMS: 3, 7, 9, 25, 39, 62, 69

Questions?

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