# MA104 Lesson 50

## LESSON 50 - EXTREMA OF FUNCTIONS OF TWO VARIABLES I

Thursday, 17 April, 2008

# Outline


1. Admin
2. Last Class
3. EXTREMA OF FUNCTIONS OF TWO VARIABLES I
   - Course Guide
   - Definitions
   - Examples and Board Work
   - Do Problem Help
4. Look Forward - EXTREMA OF FUNCTIONS OF TWO VARIABLES II

# Admin

1. No class on Friday

# Admin

1. No class on Friday
2. Quiz - Who wants 15 points for a quiz?

# Quiz

1. You can answer the question or
2. You have these options
    1. Phone a friend
    2. Ask the audience
    3. Turn over the hot seat
    4. Take the money and run

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3. (2pts) What is the domain of the function $f(x, y) = \sqrt{x^2 - y^2}$

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4. (2pts) What is the range of the function $f(x, y) = \sqrt{x^2 - y^2}$

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5. (2pts) What is the limit if it exists of the function $\lim_{(x,y)\to(4,0)} \sqrt{x^2 - y^2}$

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3. (3pts) What is the gradient of the function $f(x, y) = 2x^2 - 4xy + y^4 + 2$ at the point $(1, 2)$

# Quiz

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4. (3pts) What is the directional derivative of the function $f(x, y) = 2x^2 - 4xy + y^4 + 2$ from the point $(1, 2)$ towards the point $(3, 5)$

# Quiz

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5. (3pts) What are the critical points of the function $f(x, y) = 2x^2 - 4xy + y^4 + 2$?

# Gradient & Directional Derivative PSL 6

Questions?

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# Objectives

1. Given the surface , defined by a function which has continuous partial derivatives over some region, examine the level curves for possible maximum or minimum values.
2. Understand the definition of a critical point and be able to find the critical points of a function of two variables.
3. Use the Second Derivatives Test to classify a critical point as a local maximum, local minimum, or saddle point.
4. Understand why the discriminant will always be negative for a saddle point.

# READ

1. Stewart: Section 14.7, pages 922-928 (Stop at Absolute Max and Min Values).

# THINK ABOUT

1. Compare the methods of finding extrema for single and multivariate functions. What are the similarities/differences?

# DO Problems

1. Section 14.7/ 3, 5, 7, 9, 11

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1. Theorem 2
2. Critical Points
3. Second Derivative Test

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# Examples

1. The Football
2. Book Examples
3. Board Work

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# DO Problems

1. Section 14.7/ 3, 5, 7, 9, 11

# LESSON 51 - EXTREMA OF FUNCTIONS OF TWO VARIABLES II

1. OBJECTIVES:
   1. Find the absolute maximum and minimum of a given continuous function on a closed and bounded set using the Extreme Value Theorem and Closed Interval Method for functions of two variables.
2. READ:
   1. Stewart: Section 14.7, pages 928-930 (Start at Absolute Max and Min Values).
3. THINK ABOUT:
   1. Why do we sometimes use the Second Derivatives Test and other times we invoke the Extreme Value Theorem for functions of two variables?
4. DO:
   1. Section 14.7/ 30, 32, 33

# Questions?

Questions?