

## MA104 Lesson 51

### LESSON 51 - EXTREMA OF FUNCTIONS OF TWO VARIABLES II

Monday, 21 April, 2008

# Outline

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

# Birthday Cadet

Who's Birthday is It?

# Birthday Cadet

Who's Birthday is It?

- ① This cadet is from a city in Ohio!

# Birthday Cadet

Who's Birthday is It?



2

# Birthday Cadet

Who's Birthday is It?

- 3 Yes it is Sandusky, Ohio

# Birthday Cadet



1

# Birthday Cadet

- 2 This cadet is part of the American Society for Engineering Management, the fishing club, the hunting club, Rifle team, and the Racquetball team.

# Birthday Cadet



3

# Birthday Cadet

4 James Lewis is 21 today, 21 March 2008

# Birthday Cadet

Who's Birthday is It?

# Birthday Cadet

Who's Birthday is It?

- 1 This cadet is from a city in Illinois!

# Birthday Cadet

Who's Birthday is It?



2

# Birthday Cadet

Who's Birthday is It?

- 3 Yes it is Rochester, Illinois

# Birthday Cadet



1

# Birthday Cadet

- 2 This cadet is part of the Glee Club, the Theatre Arts Guild, and a Staff and Usher.

# Birthday Cadet



3

# Birthday Cadet

- 4 Maren Lowrey is 19 today, 21 March 2008

# Birthday Cadet

Who's Birthday is It?

# Birthday Cadet

Who's Birthday is It?

- 1 This cadet is from a city in Pennsylvania!

# Birthday Cadet

Who's Birthday is It?



2

# Birthday Cadet

Who's Birthday is It?

- 3 Yes it is Camp Hill, Pennsylvania!

# Birthday Cadet



1

# Birthday Cadet

- ② This cadet is part the German Language Club, the Scoutmaster's Council, the Speech Team, and the Wargames Committee.

# Birthday Cadet



3

# Birthday Cadet

- 4 Colin Reynolds is 19 today, 21 March 2008

# Admin

- 1 IT Lab on Tuesday and Wednesday.
- 2 Mini-WPR on Friday. Block IV material through lesson 52  
Multivariate Optimization.
- 3 Project - Problem 1.
  - 1 Projectile Motion.
  - 2 Solve for initial velocity at the far wall.
  - 3 Solve the distance formula for the varying distance to the wall.
  - 4 Solve this equation for  $x$ . Sub this into the projectile motion and plot.

# Lesson 49 - Extrema of Functions of Two Variables I

Questions?

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# 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.

# READ

- ① Stewart: Section 14.7, pages 928-930 (Start at Absolute Max and Min Values).

# 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?

# DO Problems

1 Section 14.7/ 30, 32, 33

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- 1 Theorem 2
- 2 Critical Points
- 3 Second Derivative Test
- 4 Theorem 9, pg 929

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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
- 2 Section 14.7/ 30, 32, 33

# LESSON 52 - SOLVING MULTIVARIATE OPTIMIZATION PROBLEMS I

## 1 OBJECTIVES:

### 1 Model and solve multivariate optimization problems.

- 1 Given a problem, be able to determine a multi-variable objective function.
- 2 Given limitations in a problem, write a constraint equation.
- 3 Transform a multivariable objective function into a two variable objective function when only one constraint exists.
- 4 Interpret the results of a mathematical solution as it applies to a problem.

## 2 READ:

- 1 Stewart: Section 14.7, pages 922-930.
- 2 Student Notes.

## 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/ 39, 43, 46

# Questions?

## Questions?