MA153 Lesson 21

LESSON 21 - Min and Max

25 September, 2008

Outline

1. Admin
2. Last Class
   - Directional Derivatives and the Gradient Vector II
3. Min and Max
   - Course Guide
   - Definitions
   - Board Work
   - Examples
   - Homework Help
4. Look Forward

Birthday Cadet

Who's Birthday is It?

Birthday Cadet

Who's Birthday is It?

1. This cadet is from a city in California

Birthday Cadet

Who's Birthday is It?

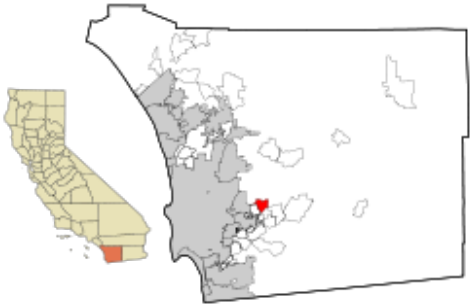
2

Birthday Cadet

Who's Birthday is It?

3. Yes Lake Side California or San Diego area

Birthday Cadet



1

Birthday Cadet

2. This cadet is part of the Chess Club and Company Football?

Birthday Cadet

3

Birthday Cadet

3.
4. Gerrit Van Ommering is 20 Tomorrow 26 September!

Admin

1. Project Questions?

Admin

2. Guest Lecture - Friday, 26 September, Dean's Hour, Washington Hall 5006

Admin

3. Next week - IT Lab Wednesday and Thursday - Project Comp Day Drop Friday

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Directional Derivatives and the Gradient Vector II

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4. So we can re-write our Directional Derivative as:

$$D_u f(x, y) = \nabla f(x, y) \cdot \overrightarrow{u}$$

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5. Suppose f is a differentiable function of two or three variables. The maximum value of the directional derivative $D_u f(\overrightarrow{x})$ is $|\nabla f(\overrightarrow{x})|$ and it occurs when $\overrightarrow{u}$ has the same direction as the gradient vector $\nabla f(\overrightarrow{x})$.

Directional Derivatives and the Gradient Vector II

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$$F_x(x_0, y_0, z_0)(x - x_0) + F_y(x_0, y_0, z_0)(y - y_0) + F_z(x_0, y_0, z_0)(z - z_0) = 0$$

Homework Help

Questions? - Homework Help

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Objectives

Min and Max - 14.7

1. Understand the contrast between single variable optimization problems (relatively few) and multi-variable optimization (many possible solutions).
2. Determine the critical points of a function.
3. Classify the critical points of a function using the Second Derivative Test.
4. Understand the difference between local and absolute extreme points.
5. Determine the absolute maximum and minimum values of a function of two variables.
6. HOMEWORK PROBLEMS: 3, 6, 39, 44

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Definitions

1. Definition 1 - Page 923
2. Theorem 2 - Page 923
3. Definition 3 - Page 924
4. Definition 8 - Page 928
5. Definition 9 - Page 929

MA 104 Block IV Board Sheet

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Board Work

1. Board Work

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Mathematica Examples

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Homework Help

Look Forward

Maximum and Minimum - 14.8

1. Understand the geometric justification for the method of Lagrange multipliers.
2. Use the method of Lagrange multipliers to determine the absolute maximum and minimum values of a function of two variables subject to one constraint.
3. Use the method of Lagrange multipliers to determine the absolute maximum and minimum values of a function of three variables subject to two constraints.
4. Model and analyze problems using Lagrange multipliers.
5. HOMEWORK PROBLEMS: 1, 3, 10

Questions?

Questions?