

MA104 Lesson 49

LESSON 49 - PSL 6

Wednesday, 16 April, 2008

Outline

- 1 Admin
- 2 Last Class
 - **Mathematica and the last two classes of do problems**
- 3 Problem Solving
 - **Duff Beer**
 - **The West Point Hiker**
- 4 Look Forward - **EXTREMA OF FUNCTIONS OF TWO VARIABLES I**

Admin

- 1 We will have class tomorrow (17 April 2008) , but not on Friday.
- 2 Show up Thursday, but not Friday - Any Questions?

Gradient & Directional Derivative

Questions?

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DO Problems

- 1 Section 14.6/ 1, 3, 7, 8, 11, 15
- 2 Section 14.6/ 21, 23, 28, 32

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- 4 On your very limited function GPS you notice your current position is $you(-4, -4)$ and your elevation was at 82.
- 5 You use your range finder and binoculars and notice an cooler full of ice cold Duff Non-Alcoholic beer is sitting at the location $Duff(4, 4)$ and also at the elevation of 82.

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- 4 On your very limited function GPS you notice your current position is $you(-4, -4)$ and your elevation was at 82.
- 5 You use your range finder and binoculars and notice an cooler full of ice cold Duff Non-Alcoholic beer is sitting at the location $Duff(4, 4)$ and also at the elevation of 82.
- 6 What is the slope / directional derivative of your path if you take off towards the beer?

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Hiker

- 1 You are hiking and come upon a hill. You being a resourceful cadet assume the hill can be described by the following function:

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$$hiker(x, y) = 8 - 2x^2 - y^2$$

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- 3 You notice five points of interest: Your initial point is *you* $(-2, -2)$, an MRE is sitting at *MRE* $(-1.5, 0)$, a box of girl scout cookies is at *cookies* $(-0.75, -1.5)$, a cell phone is at *cell* $(0, -0.9)$, and the hilltop at *hill* $(0, 0)$.

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- 4 a. At Which point(s) do you believe the hill to have the steepest slope? Why?

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- 5 b. What change in elevation would you experience if you moved along a contour line?

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- 4 a. At Which point(s) do you believe the hill to have the steepest slope? Why?
- 5 b. What change in elevation would you experience if you moved along a contour line?
- 6 c. Find the point (among the points listed) where you would experience the greatest slope along the route.

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- 4 a. At Which point(s) do you believe the hill to have the steepest slope? Why?
- 5 b. What change in elevation would you experience if you moved along a contour line?
- 6 c. Find the point (among the points listed) where you would experience the greatest slope along the route.
- 7 d. Find the point along the route from the MRE to the cookies where you experience the greatest slope.

LESSON 50 - EXTREMA OF FUNCTIONS OF TWO VARIABLES I

1 OBJECTIVES:

- 1 Given the surface $z = f(x, y)$, 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.

2 READ:

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

3 THINK ABOUT:

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

4 DO:

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

Questions?

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