

Closing Thur: HW 14.2 (part 1)
Closing *next* Tue: HW 14.2 (part 2)
Closing *next* Thur: HW 14.3/4 (last HW)
Final: Sat, March 10, 5:00-7:50pm,
PAA Building

Entry Task: Find $\frac{\partial z}{\partial x}$ and $\frac{\partial z}{\partial y}$ for

$$z = 5\ln(x) - x^4 y^2 e^{3x} - \frac{4}{y^2}$$

Final Time and Locations

Sat, March 10th

5:00-7:50pm

The room where you take the exam depends on your quiz section. Know your quiz section!

Building

PAA –Physics/Astronomy Auditoriums

For BC/BD, AC/AD: PAA A102

For AA/AB, BB: PAA A118

For BA: PAA A110



Interpreting as a rate

Your company produces and sells **two** products (hats and sunglasses)

x = number of hats

y = number of glasses

Profit is given by

$$P(x, y) = -3x^2 + 30x - 5y^2 + 130y + 2xy - 100$$

1. Find the partial derivatives.

2. Find and interpret

$P_x(5,8)$ and $P_y(5,8)$.

3. Estimate the values of

$$\frac{P(5.001, 8) - P(5, 8)}{0.001} \approx$$
$$\frac{P(5, 8.01) - P(5, 8)}{0.01} \approx$$

From HW: (Cobb-Douglas Model)

Q = units produced

K = capital expenditures
(in thousand dollars)

L = hours of labor

$$Q = 75K^{1/3}L^{2/3}$$

Assume there are:

\$2,744,000 in capital expenditures and
4913 in total labor hours.

Find and interpret $\frac{\partial Q}{\partial K}$ and $\frac{\partial Q}{\partial L}$.

Definition

A point (a,b) is a ***critical point*** for a function $z = f(x, y)$ if BOTH

$$f_x(a, b) = 0 \quad \mathbf{and} \quad f_y(a, b) = 0.$$

Going back to our last example:

$$P(x, y) = -3x^2 + 30x - 5y^2 + 130y + 2xy - 100$$

Find the critical point.

Graphical Interpretation

Pretend you are skiing on the surface

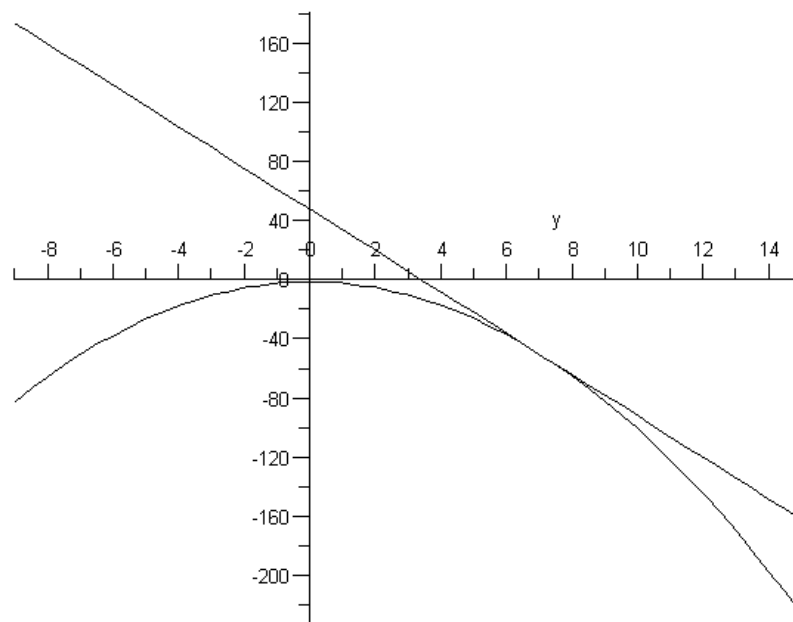
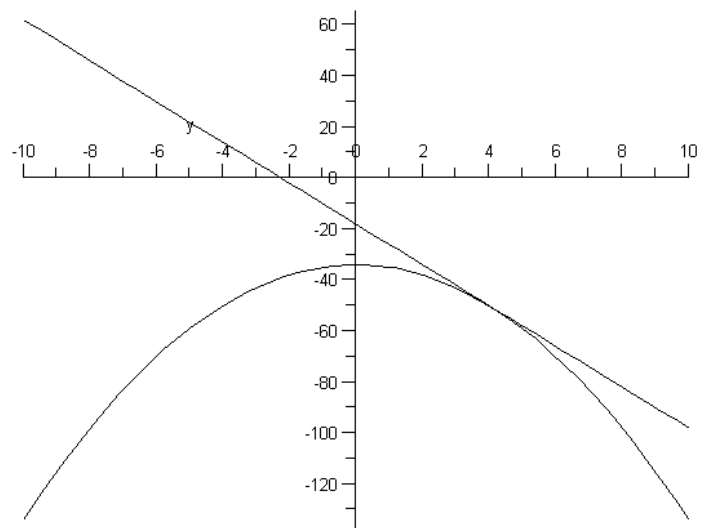
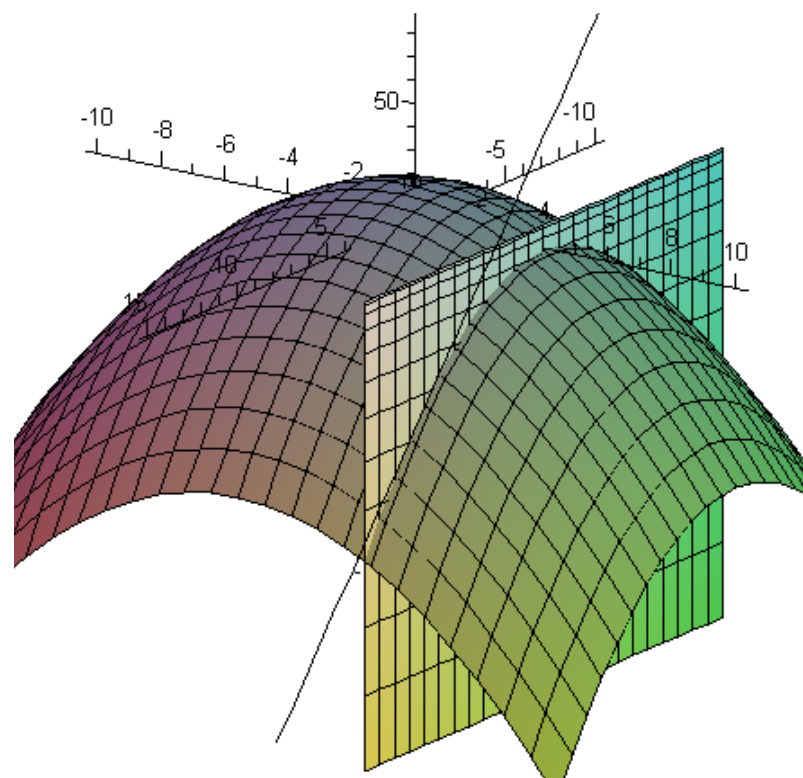
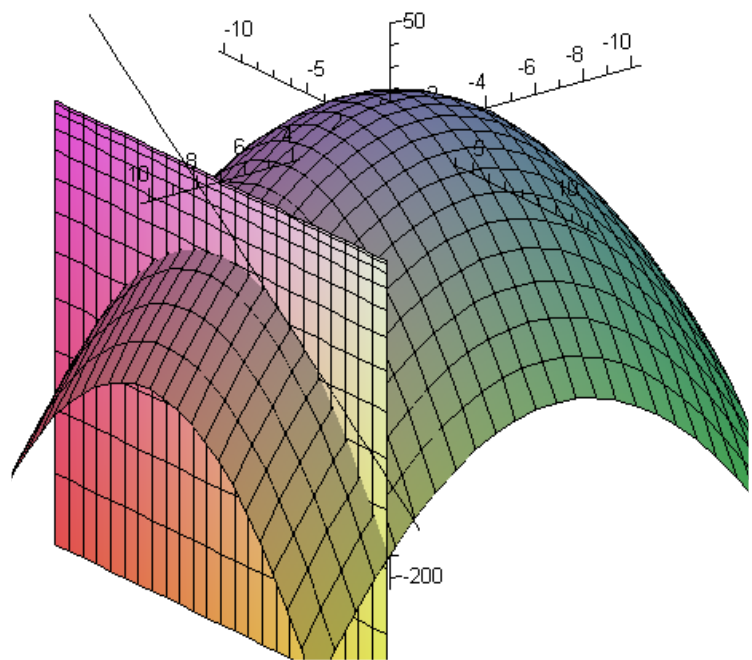
$$z = f(x, y) = 15 - x^2 - y^2$$

1. Find $\frac{\partial z}{\partial x}$ and $\frac{\partial z}{\partial y}$

2. Find and interpret
 $f_x(7,4)$ and $f_y(7,4)$

3. Find the critical point.

Aside: Graphical Interpretations



Example:

Find all critical points of

$$f(x, y) = 2x^4 + y^2 - 4xy + 1$$