

## 14.8-15.1: Optimization, Double Integrals

Wednesday, March 16

### Optimization

Find the extreme values of  $f(x, y) := x^2 + y^2 + 4x - 4y$  on the region  $x^2 + y^2 \leq 9$ . Sketch the region and a contour plot of  $f$ .

You are in charge of buying advertising time for a senatorial campaign. Your very scientific models predict that  $t$  hours of advertising time in district  $A$  will win you  $100\sqrt{t}$  new voters and  $t$  hours in district  $B$  will win you  $400\sqrt{t}$  new voters. If the networks in  $A$  charge 10 dollars per hour and the networks in  $B$  charge 20 dollars per hour and you have 90 dollars to spend, how should you divide your money?

## Optimization with Two Constraints

Find the maximum and minimum values of  $f(x, y, z) = x + y + z$  given the constraints  $x^2 + y^2 + z^2 = 1$ ,  $x = 2y$ .

## Double Integrals!

Sketch the solid whose volume is given by the integral  $\int_0^1 \int_0^1 (4 - x - 2y) dx dy$  and find the volume.

Find the integral  $\iint_R ye^{-xy} dA$  on the region  $R = [0, 2] \times [0, 3]$ .