

## Homework 6, Calc III

Due Friday March 20th, 2009

1. Find the absolute maximum and absolute minimum values of the function  $f$  on the domain  $D$ .
  - (a)  $f(x, y) = x^2 + y^2 + x^2y + 4$  and  $D = \{(x, y) \mid |x| \leq 1, |y| \leq 1\}$ .
  - (b)  $f(x, y) = xy^2$  and  $D = \{(x, y) \mid x \geq 0, y \geq 0, x^2 + y^2 \leq 3\}$ .
  - (c)  $f(x, y) = \sin(xy) \cos(xy)$  and  $D = \{(x, y) \mid 0 \leq x \leq \pi/2, 0 \leq y \leq \pi\}$ .
2. Find the maximum and minimum volumes of a rectangular box whose surface area is  $1500\text{cm}^2$  and total edge length is  $200\text{cm}$ .
3. Find the extreme values of  $f$  on the region described by the inequality.

$$f(x, y) = 2x^2 + 3y^2 - 4x - 5, \quad x^2 + y^2 \leq 16$$

4. Use Lagrange multipliers to find the maximum and minimum values of the function subject to the given constraint(s).
  - (a)  $f(x, y) = e^{xy} \quad x^3 + y^3 = 16$ .
  - (b)  $f(x, y) = x^3 + y^3 \quad x^2 + 4y^2 = 65$ .
  - (c)  $f(x, y, z) = x^2y^2z^2 \quad x^2 + y^2 + z^2 = 1$ .
  - (d)  $f(x, y, z) = xy + yz \quad xy = 1 \quad y^2 + z^2 = 1$ .