## Homework 6

- 1. Find the maximum and minimum values of  $f(x, y) = x^2 + y^2 2x$  on the closed triangular region D with vertices (2, 0), (0, 2), (0, -2).
- 2. Find the maximum and minimum values of  $f(x, y) = x^2 + y^2 + x^2y + 4$  on the square  $D = \{(x, y): -1 \le x \le 1, -1 \le y \le 1\}$ .
- 3. Use Lagrange multiplier method to find the maximum and minimum value of  $f(x, y) = x^3 + 2y^3$  subject to  $x^2 + y^2 = 1$ .
- 4. A city is planning to set up an fire station to minimize the response time to two critical locations. The first location is at (2, 1). The second location is at (-1, 0). The city hall is at (0, 0). The response time to the first location is  $d_1^2$ , where  $d_1$  is how far it is from the fire station. Due to traffic near the city center, they calculate that the response time to the second location is  $3d_2^2$ , where  $d_2$  is how far it is from the fire station. The fire station must be placed within a radius of 8 miles from the city hall. Find the optimal location (x, y) to minimize the *total response time*.