MATH 202: Homework 7

due Wednesday, November 1

(1) Show that a rectangular box with a given volume V has minimal surface area when it is a cube.

(2) Let $f(x, y) = 3x^2 - y^2$. Find the integral curve $\gamma(t)$ for the gradient vector field ∇f that goes through the point $(2, 1)$. Do the same for the point $(-1, 5)$.

(3) A hot plate D forms the unit disk in the xy-plane. The temperature at a point $(x, y) \in D$ is given by the function $T(x, y) = x^2 + 3xy + y^2$. What point(s) on the disk are hottest? What point(s) on the disk are coldest?

(4) Find the point on the plane $x - 2y + 3z = 8$ that is closest to $(3, 6, -1)$.

Do the following problems from the textbook:

§4.8: 2, 6, 7

§5.4: 1, 2, 6

§6.2: 3, 4, 5

§6.3: 1