

Name_____

Date_____

Vector Calculus Independent Study

Unit 4 Sample Test

1. [25 points] Find the absolute max and min of $f(x, y, z) = x - y + 3z$ on the ball $x^2 + y^2 + z^2 \leq 4$.
2. [25 points] Find and classify (as local min, local max, saddle, or undetermined) the critical points of $f(x, y) = 3x + 12y - x^3 - y^3$.
3. [25 points] Find the point on the plane $4x - 3y + z = 5$ closest to the point $(2, 1, -1)$.
4. [25 points] Show that a rectangular box of a given volume has minimum surface area when the box is a cube.