MATH 2130 – Tutorial Problems, Thu Mar 8

Critical Points and Extreme Values

Example. Find the longest and the shortest distance between the origin and the curve given by the intersection of the surfaces $y^2 + 2z^2 = 2$ and $x^2 - y^2 = 4$. (Hint: if you simplify the problem enough, no calculus is required.)

Example. Let $f(x, y) = xy - x - y$. Find the absolute maximum and absolute minimum of f over the region R bounded by the positive x- and y- axes and the line $2x + y = 8$.

Example. Let $f(x, y, z) = x^2 + \frac{1}{2}y + \frac{1}{4}z$. Find the maximum and minimum values of f, subject to the constraint $x^2 + y^2 + z^2 = 1$.

Example. Let $f(x, y, z) = x - 2y - 3z$. Find the maximum and minimum values of f, subject to the constraints $x^2 + y^2 + z^2 = 1$ and $x + y + z = 0$.