

Written HW7 – MATH 3503 Fall 2021

Due by 20 September for timely completion credit

In this homework you will do optimization using the Lagrange multiplier method. Recall that if you want to optimize the function f subject to the constraint $g = k$, then you simply solve the system

$$\begin{cases} \nabla f = \lambda \nabla g \\ g = k \end{cases}$$

1. Optimize $f(x, y) = 2x + 2xy + y$ subject to the constraint $2x + y = 100$.
2. Let $T(x, y, z) = 10 + x^2 + y^2$ represent the temperature of each point on the sphere $x^2 + y^2 + z^2 = 17$. Find the max temperature on the curve formed by the intersection of the sphere with the plane $y - z = 0$. (*hint: solve the plane for z and plug it into the sphere equation*)