

**M20550 Calculus III Tutorial
Worksheet 7**

1. Find the minimum distance from the parabola $y = x^2$ to the point $(0, 9)$.
2. Maximize the function $f(x, y, z) = xyz$ subject to the constraint $x^2 + 2y^2 + 3z^2 = 9$, assuming that x , y , and z are nonnegative. Explain why the extremum you find is a maximum.
3. Minimize the function $f(x, y, z) = x^2 + y^2 + z^2$ subject to the constraints $x + 2z = 6$ and $x + y = 12$ using the method of Lagrange multipliers. Also, explain why the extremum you find is a minimum.
4. Find the maximum value of the function $f(x, y, z) = x + 2y$ on the curve of intersection of the plane $x + y + z = 1$ and the cylinder $y^2 + z^2 = 4$.
5. Find the volume of the solid S bounded by the surface $z = xe^{xy}$, the planes $x = 2$ and $y = 1$, and the three coordinate planes (i.e. the planes $x = 0$, $y = 0$, $z = 0$).