Winter Assignment: Substitution and Lagrange Multipliers

On the Winter Assignment there is no professional problem or designated graded problems. Staple all of your problems together in one packet. Some of the problems will be graded for correctness, and others will be graded for completion.

Problem 1 *Use substitution to find the absolute maximum and minimum values for each function and constraint.*

(a) $f(x, y) = xy$, *subject to* $y = x^2 - 1$, *with* $-2 \leq x \leq 2$.

(b) $f(x, y) = 2x - y$, *subject to* $g(x, y) = x^2 + y^2 = 1$.

(c) $f(x, y) = x^2 - 3y^2$, *subject to* $\dfrac{x^2}{16} + \dfrac{y^2}{4} = 1$.

Problem 2 *Use the method of Lagrange Multipliers to identify all critical points of each function subject to the constraints.*

(a) $f(x, y, z) = xyz$, *subject to* $x + y + z = C$ *for some fixed* $C > 0$.
(You've seen this problem before, so make sure to show your work and justify your answer!).

(b) $f(x, y) = x^2 + y^2$, *subject to* $x - y + \dfrac{1}{2}(x + y)^2 = 3$.

(c) $f(x, y, z) = x^2 + y^2 + z^2$, *subject to* $x - y + z = 2$

Learning outcomes:
Author(s):