Math 32 – Workshop #17.5

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1. Let $f(x, y) = 100 - 2x^2 + 2y^2$.
   (a) Find the critical points of f.
   (b) Determine whether each critical point is local max, local min, or saddle. Justify your answer without using the second derivative test.
   (c) Sketch the graph of f and label any extrema.
2. Let $f(x, y) = 4x + 2y - 5$. Determine whether f has any critical points, then explain your answer geometrically.
3. Let $f(x, y) = x^2 + 4xy - 8y$. Find all critical points, then use the second derivative test to determine whether each is a local max, local min, or saddle.
4. Find the distance from the point $(1, 1, -5)$ to the plane given by $12x + 13y + 5z = -2$.
   Hint: to simplify the computations, minimize the square of the distance to the point.
5. Let $f(x, y) = 2y^2 - 4xy + 4x$. Let $D = \{(x, y) \mid 0 \leq x \leq 2,\ 0 \leq y \leq 2\}$. Sketch D, then find the absolute maximum and minimum values of f on D.