Worksheet 2

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(1-2) Find all points (x, y) where $f(x, y)$ has a possible relative maximum or minimum.

1. $f(x, y) = \frac{1}{2}x^2 + y^2 - 3x + 2y + 5$.
2. $f(x, y) = x^3 + y^2 - 3x + 6y$.

(3-5) Find all points (x, y) where $f(x, y)$ has a possible relative maximum or minimum. Then use the second-derivative test to determine, if possible, the nature of $f(x, y)$ at each of these points. If the second-derivative test is inconclusive, so state.

3. $f(x, y) = -x^2 + 8xy - y^2$.
4. $f(x, y) = 2x^2 + y^3 - x - 12y + 7$.
5. $f(x, y) = x^2 - 2xy + 3y^2 + 4x - 16y + 22$.
6. Minimize $\frac{1}{2}x^2 - 3xy + y^2 + \frac{1}{2}$, subject to the constraint $3x - y - 1 = 0$.
7. Find the values of x, y that minimize $x^2 + xy + y^2 - 2x - 5y$, subject to the constraint $1 - x + y = 0$.
8. Find the two positive numbers whose product is 25 and whose sum is as small as possible.
9. Find the point on the parabola $y = x^2$ that has minimal distance from the point $(16, \frac{1}{2})$.
10. Find the values of x, y and z that maximize $xy + 3xz + 3yz$ subject to the constraint $9 - xyz = 0$.