Your Name: _____

1. Consider the function $f(x, y) = 24x + 18y - 3x^2 - 9y^2 + 16$.

   (a) Show calculations to verify that $f(x, y)$ has a critical point at $(4, 1)$.

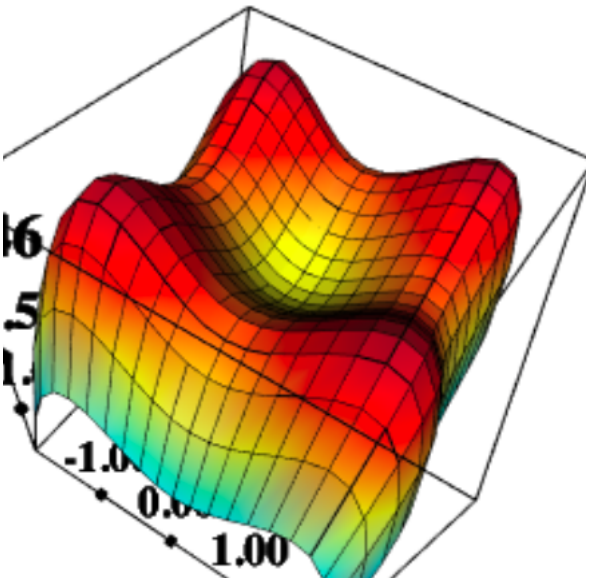
   (b) Show calculations to verify that $f(x, y)$ has a relative maximum at $(4, 1)$.

2. The online retailer, ADress, is offering two summer dresses, the Misty Breeze and the Tahitian Dream. Each Misty Breeze costs \$41 to manufacture and publicize, while each Tahitian Dream costs \$46. The manager of the company estimates that if each Misty Breeze is priced at x dollars and each Tahitian Dream at y dollars, then $101 - 5x + 4y$ Misty breeze dresses and $56 + 6x - 7y$ Tahitian Dream dresses will be sold on average every day.

   (a) Express the total daily profit from the sale of the dresses as a function of x and y.

   (b) What pricing for each dress maximizes the total daily profit? What is the maximum profit from the sale of the dresses?

3. Estimate the number of (a) relative maxima, (b) relative minima, and (c) saddle points of $g(x, y)$ from its graph provided.



4. Suppose we know that a function $f(x, y)$ has its only critical point at $(2, -1)$, and that furthermore $f_{xx}(2, -1) = 4$ and $f_{xy}(2, -1) = 2$. What need be true about f_{yy} so that f has a saddle point at $(2, -1)$? Is it possible for f to have a relative maximum at $(2, -1)$? What about a relative minimum?