QUIZ 8 - MATH 251 Friday, April 6

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Read each problem **very carefully** before starting to solve it. Each problem is worth 5 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. Consider the function $f(x, y, z) = x^2y + z^3$, with $x = s^2$, $y = 2rs$ and $z = r^2$.

   (a) Make a small diagram showing the dependencies among the variables, as shown in class.

   (b) Apply the chain rule to write a formula for $\dfrac{\partial f}{\partial s}$. Please, do not compute any derivatives for this part.

   (c) Use the formula you wrote in Part (b) to calculate $\dfrac{\partial f}{\partial s}$.

2. Consider the function

$$f(x, y) = x^3 + y^4 - 6x - 2y^2.$$

(a) Find its critical points.

(b) Compute $D(x, y)$ (general formula).

(c) Use the second derivative test to find the local max/min and the saddle points of f. (If the test is inconclusive, say so and stop.)