

Name: _____

Score: _____

Instructions: You must show supporting work to receive full and partial credits. No text book, notes, formula sheets allowed.

1. (4) Find the critical points and use the second derivative test to determine their type as local maximum, local minimum, saddle for the function $z = f(x, y) = x^3 - 3xy + y^3$.

2. (4) Use Lagrange multiplier method to find the extrema of the function $z = f(x, y) = x + 2y$ subject to the constraint $x^2 + y^2 = 5$.

3. (4) Evaluate the iterated integral $\int_0^1 \int_{2x}^2 (1 + 2y) dy dx$.

4. (4) Sketch the region R for the double integral $\int_0^1 \int_{2x}^{3-x^2} f(x, y) dy dx$.

5. (4) Sketch the region R for the double integral $\int_0^2 \int_0^{2x} f(x, y) dy dx$ and reverse the order of the iterated integral.