Exam 21 Name: _____ RHS

Show your work for full credits.

Let $f(x,y) = x^2y + xy^2 - xy$

1. Find $f_x$ and $f_y$
2. Find $f_{xx}$, $f_{yy}$, and $f_{xy}$
3. Find $T_2(x,y)$, the 2nd order Taylor Polynomial, centered at (0, 0)
4. Find an equation of a tangent plane at (0, 0)
5. Approximate $f(0.01, -0.02)$, using the tangent plane.
6. Find $D_u f$, directional derivative of $f$, at (1, 2) toward (2, 1).
7. Find the value of maximum directional derivative of $f$ at (1, 2)
8. Find the unit vector which in line of the maximum directional derivative at (1, 2)
9. Find local min/max, if any.

10. Let $z = e^y \cos x, y = st, \text{and } x = \sqrt{s^2 + t^2}$. Find $\frac{\partial z}{\partial t}$
11. Let $xyz = \sin(x + y + 2z)$. Find $\frac{\partial z}{\partial x}$

12. Find the points on the surface $y^2 = 9 + xz$ that are closest to the origin.

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13. If the length of the diagonal of a rectangular box must be L, what is the largest possible volume? (Must be solved by using 2nd derivative test in Multivariable Calculus)