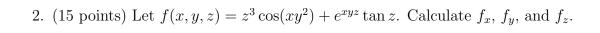
MAT 261—Exam #2A—3/13/14

Name:	
С	alculators are not permitted. Show all of your work using correct mathematical notation.
1.	(25 points) Consider the function $f(x,y) = \ln(x^2 - y)$.
	(a) Sketch the domain of f .
	(b) Find the equation of the level curve of f passing through the point $(2,3)$, and sketch its graph.
	(c) Find the average rate of change of f with respect to y from $(2,1)$ to $(2,3)$.
	(d) Find the gradient of f at the point (2.1)
	(d) Find the gradient of f at the point $(2,1)$.
	(e) Find the instantaneous rate of change of f at the point $(2,1)$ in the direction \mathbf{j} .



3. (10 points) Find the linearization of the function $f(x,y) = \sqrt{x^2 + y^4}$ at the point (3, 2).

- 4. (30 points) Consider the function $f(x,y) = x^2 + y^2 xy + x$.
 - (a) Find the maximum value of the directional derivative of f at the point (3,5).

(b) Find the directional derivative of f at the point (3,5) in the direction of $\mathbf{v}=3\mathbf{i}-\mathbf{j}$.

(c) Find the coordinates of all local maxima, local minima, and saddle points of f.

(d) If $x = \sin 2t$ and $y = 2e^{3t}$, calculate $\frac{df}{dt}$ when t = 0.

5. (10 points) Let $f(x,y) = \frac{x^2y}{x^4 + y^2}$. Show that $\lim_{(x,y)\to(0,0)} f(x,y)$ does not exist.

Hint: Consider a parabolic path of approach.

6. (10 points) Use Lagrange multipliers to find the point on the line 4x - 6y = 25 where the function $f(x,y) = x^2 + 2y^2$ has its minimum value.