

- PRINT NAME _____
- Write version on your blue book and hand in this exam inside your blue book. VERSION A
- Put your name, ID number, and section number (or time) on your blue book.
- You may have ONE PAGE of notes. NO CALCULATORS are allowed.
- **You must show your work to receive credit.**

1. (24 pts.) Suppose $g(x, y)$ is “well behaved” (that is, you can differentiate it as much as you want and those derivatives are continuous), $x = s - t$ and $y = s + 3t$.
- (a) Express $\frac{\partial g}{\partial s}$ in terms of g_x and g_y ONLY.
- “ONLY” means that neither s nor t should appear in your answer.
- (b) Express $\frac{\partial^2 g}{\partial s \partial t}$ and $\frac{\partial^2 g}{\partial t \partial s}$ in terms of g_{xx} , g_{xy} and g_{yy} ONLY.

For problems 2, 3, and 4 $f(x, y) = x^2 + y^3 + 4y^2 + 2xy$.

2. (36 pts.) (a) For what value of \mathbf{u} is $D_{\mathbf{u}}f(0, 1)$ a maximum?
 (b) What is the maximum value of $D_{\mathbf{u}}f(0, 1)$?
 (c) Find a value of \mathbf{u} so that $D_{\mathbf{u}}f(0, 1) = 0$.
3. (12 pts) Find the tangent line to the level curve $f(x, y) = 5$ at $(0, 1)$.
4. (28 pts) (a) Find the critical points of $f(x, y)$.
 (b) Use the second derivative test to classify them.

END OF EXAM

Final Exam: 11:30 Wed. 12/11 in YORK 2722