

Name \_\_\_\_\_

Mathematics 206a: Multivariable Calculus  
Fall Semester 2005

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Quiz #15

October 6

Suppose  $\mathbf{F} : \mathcal{R}^2 \rightarrow \mathcal{R}^3$  with rule  $\mathbf{F}(x, y) = (y, x, x^2 - y^2)$   
and  $\mathbf{G} : \mathcal{R}^3 \rightarrow \mathcal{R}^1$  with rule  $\mathbf{G}(x, y, z) = x^2 + y^2 + z^2$ .

Note that  $\mathbf{G} \circ \mathbf{F} : \mathcal{R}^2 \rightarrow \mathcal{R}^1$ .

A. Calculate the Jacobian matrix of the function  $\mathbf{F}$  at the point  $(2, 1)$ .

B. Calculate  $\mathbf{F}(2, 1)$ .

C. Calculate the Jacobian matrix of the function  $\mathbf{G}$  at the point  $\mathbf{F}(2, 1)$ .

D. Calculate the Jacobian matrix of the function  $\mathbf{G} \circ \mathbf{F}$  at the point  $(2, 1)$ .