Math 896-503 **Assignment # 9** **23 June 09**

Not to be handed in

1. Suppose that $\mathbf{0} = (0, 0)$, $r > 0$ and $f = (f_1, f_2)$ mapping $B_r(\mathbf{0})$ into $\mathbb{R}^2$ is C^1. Prove that if $df_{\mathbf{0}}$ is invertible and $f^{-1} = (g_1, g_2)$ is the local inverse, then

$$D_1(g_1)(f(\mathbf{0})) = \frac{D_2(f_2)(\mathbf{0})}{Jf_{\mathbf{0}}}, \qquad D_2(g_1)(f(\mathbf{0})) = \frac{-D_2(f_1)(\mathbf{0})}{Jf_{\mathbf{0}}},$$

and

$$D_1(g_2)(f(\mathbf{0})) = \frac{-D_1(f_2)(\mathbf{0})}{Jf_{\mathbf{0}}}, \qquad D_2(g_2)(f(\mathbf{0})) = \frac{D_1(f_1)(\mathbf{0})}{Jf_{\mathbf{0}}},$$

where $Jf_{\mathbf{0}}$ is the determinant of the 2×2 matrix for $df_{\mathbf{0}}$.