Suppose that $r : [0,1]\times[0,1] \to \mathbb{R}^3$ with $r(u,v) = (x(u,v), y(u,v), 0)$ be any smooth parametrization of the unit square $0 \le x \le 1$, $0 \le y \le 1$, $z = 0$. Let $\vec{N}$ be the corresponding normal vector. Show that

$$\|\vec{N}\| = \left|\frac{\partial(x,y)}{\partial(u,v)}\right|.$$