1. Assume that $n = 1$ and $u \in W^{1,p}((0,1))$ for some $1 \leq p < \infty$. Show that $u$ is equal a.e. to an absolutely continuous function and $u'$ (which exists a.e.) belongs to $L^p((0,1))$.

2. Suppose $U$ is connected and $u \in W^{1,p}(U)$ satisfies $Du = 0$ a.e. in $U$. Prove $u$ is constant a.e. in $U$.

3. Verify that if $n > 1$ the unbounded function $u = \log \log(1 + 1/|x|)$ belongs to $W^{1,n}(U)$ for $U = B^0(0,1)$. 