Sheet 1
Submission on Tuesday, 15.10.19 in class.

Exercise 1. (chain rule)
Let $X$, $Y$, and $Z$ be Banach spaces. Show that for $f : X \to Y$ and $g : Y \to Z$ both differentiable, one has that $g \circ f$ is differentiable and satisfies

$$D(g \circ f)(x) = Dg(f(x)) \circ Df(x)$$

for all $x \in X$. (5 points)

Exercise 2. (gradient and inverse)
Let $V$ and $W$ be open subsets of $\mathbb{R}^n$ and $j : V \to W$ be differentiable and bijective. Furthermore, assume that $Dj(v)$ is an isomorphism for all $v \in V$. For a differentiable function $f : V \to \mathbb{R}$, compute $\nabla (f \circ j^{-1})$. (5 points)