Homework assignment, Oct. 15, 2007.

1. Find the differential df for f defined by $f(r,\theta) = \begin{pmatrix} r\cos\theta \\ r\sin\theta \end{pmatrix}$

2. Find the differential df and the gradient ∇f for a f defined on $\mathbb{R}^n$ by

   a) $f(\mathbf{x}) = (\mathbf{x}, \mathbf{x}_0)$ (here $\mathbf{x}_0$ is a fixed vector in $\mathbb{R}^n$) ;

   b) $f(\mathbf{x}) = |\mathbf{x}|^2$;

   c) $f(\mathbf{x}) = |\mathbf{x}|$;

   d) $f(\mathbf{x}) = 1/|\mathbf{x}|$ $(\mathbf{x} \neq \mathbf{0})$;

3. p. 196 # 2.

4. p. 197 # 8.