## Homework assignment, April 2, 2007.

1. Let  $F : \mathbb{R} \to \mathbb{R}$  is defined as

$$F(x) = \begin{cases} e^{-1/x^2}, & x \neq 0\\ 0, & x = 0 \end{cases}$$

Show that  $F \in C^{\infty}$  (i.e. that all derivatives of F exist and continuous) but that  $F^{(n)}(0) = o$  $\forall n \in \mathbb{N}$ .

2. Let  $g: \mathbb{R} \to \mathbb{R}$  is defined as

$$g(x) = \begin{cases} x^2 \sin \frac{1}{x}, & x \neq 0\\ 0 & x = 0 \end{cases}$$

Show that f'(x) exist for all x but f' is not continuous at 0.

3. P. 192 # 23 a, b, # 24