Homework 8

MAS501 Analysis for Engineers, Spring 2011

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1. Let f be continuous on $[a,b]$ and α be a jump function having jumps at the points $x_1, x_2, \cdots, x_N$.

   (a) Prove that $\int_a^b f\, d\alpha$ exists.
   Hint: Use Theorem 6.1.2 in the textbook.

   (b) Show that
   $$\int_a^b f\, d\alpha = \sum_{n=1}^{N} f(x_n)\, c_n,$$
   where $c_n := \alpha(x_n^+) - \alpha(x_n^-)$, $1 \le n \le N$.

2. Give an example of a function α which is continuous on $[0,1]$ and differentiable on $(0,1)$ such that $\alpha \in BV[0,1]$, but α' is unbounded on $(0,1)$.