HOMEWORK ASSIGNMENT NO. 9

DATE: MATCH 16, 2010 DUE: MARCH 30, 2010

(1) Explain why if
$$a_k k! + a_{k-1}(k-1)! + \cdots + a_2 2! + a_1 1! = 1$$
where each a_i is an integer with $0 \leq a_i \leq i$ then $a_1 = 1$ and $0 = a_2 = a_3 = a_4 = \ldots$.

(2) Give an example each of a function on the set of integers $\{1, 2, 3, 4, 5, 6\}$ that maps to the set of colors $\{red, green, blue, yellow, chartreuse, magenta\}$ that satisfies each of the conditions below.
  (a) A function which is neither one-to-one nor onto.
  (b) A function which is both one-to-one and onto.
  (c) A function which is one-to-one, but not onto.
  (d) A function which is onto, but not one-to-one.

(3) Which of the following functions which map $\mathbb{R}$ to the set $\mathbb{R}$ are one-to-one or onto or both or neither?
  (a) $f_1(x) = x$
  (b) $f_2(x) = |x|$
  (c) $f_3(x) = x^3 - x$
  (d) $f_4(x) = x^3 + x$
  (e) $f_5(x) = x^2$
  (f) $f_6(x) = 1$