

CS5000: Assignment 8  
Due: Nov. 7, 2008 by 11:59pm

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**Problem 1: 2 points**

Show that COMP is a proper subset of the class of primitive recursive functions.

**Problem 2: 2 points**

Let  $f \in COMP$ . Show that there is a  $k > 0$  such that  $f(x_1, \dots, x_n) \leq \max\{x_1, \dots, x_n\} + k$ .

**Problem 3: 3 points**

Let  $P(x) = 1$  if  $x$  is the sum of two perfect squares and 0 otherwise. Show that  $P$  is primitive recursive.

**Problem 3: 5 points**

Let  $h(0) = c; h(t + 1) = g(t, h(t))$ , where  $c$  is a constant and  $g \in COMP$ . Show that there is  $k > 0$  such that  $h(t) \leq tk + c$ .