

Name: \_\_\_\_\_

PanthID: \_\_\_\_\_

Quiz 6 – take home

MAD 2104

Summer A 2011

**Due Monday, June 20. For full credit, you must show all your work.**

1. (10 pts) Suppose you write the list of all three digits numbers: 100, 101, 103, ..., 998, 999.

(a) How many different numbers on your list contain the digit 0?

(b) How many times the digit 0 was used in writing the list above?

2. (12 pts) Let  $p(n)$  denote the number of different partitions of a set  $A$  with  $n$  elements. (By the Theorem 2 in section 8.5,  $p(n)$  is also the number of different equivalence relations on a set with  $n$  elements.) As an example, note that  $p(2) = 2$ ; indeed, if  $A = \{a_1, a_2\}$ , the only possible partitions of the set  $A$  are  $\{a_1, a_2\}$  and  $\{a_1\} \cup \{a_2\}$ .

(a) (8 pts) Show that  $p(n)$  satisfies the recursive relation

$$p(n) = \sum_{j=0}^{n-1} C(n-1, j)p(n-j-1), \text{ for } n \geq 1, \text{ and } p(0) = 1.$$

(b) (4 pts) Use the recursive relation of part (a) to determine the number of different equivalence relations on a set with 8 elements.