LPS ECON-103-601, Fall 2015
HW Due 09.08.15 Name: _____

Please return to the Economics Department in the TA Box with your name *and my name* (Kory Kantenga) on it by 17.00 Tuesday, Sep 8. Show all work clearly and in order. Circle or box your final answer but points will be awarded based on a correct solution. A solution should always justify the steps taken and explain the assumptions needed to reach a final answer (e.g. how do you know you are not dividing by zero in the last step?).

Q1

How many unique, four digit pin code numbers are there? Each digit in the pin code must be chosen from the range 0-9 (inclusive).

Q2

Hilary is stacking eight books on a shelf. How many ways she arrange the books if three books are identical and the other five are distinct from all others?

Q3

Kevin is preparing for battle and can make one battle kit that contains exactly one suit of armor, one helmet, and two weapons. There are four distinct suits of armor, three distinct helmets, and five distinct weapons. Given his choices, how many distinguishable battle kits can Kevin make?

Q4

Fifteen identical boxes are being sent to five distinct people. How many different ways can the boxes get distributed if it is possible for people to get no boxes (e.g. all the boxes get lost)?

Q5

A committee consisting of two monks and three knights is being formed from a group of six monks and five knights; every monk or knight is a distinguishable person. How many distinct committees are possible if one monk and one knight refuse to serve together?

Q6

A robot named Karel is trapped on a Cartesian grid. Karel travels in steps where each step either moves Karel to (x + 1, y) or (x, y + 1), where (x, y) is Karels location before making the step. If Karel is located at (1, 1), how many distinct paths can Karel take to get to (6, 8)? (Two paths are distinct if the sequences of coordinates that Karel travels to contain at least one different coordinate pair.)

Q7

HongVan is doing a photo shoot at South Beach with ten puppies. She starts by taking a photo of herself. Next, she takes a photo of each dog individually. Then she takes photos of every possible pair of dogs, every possible group of three dogs, every possible group of four dogs, and continues taking photos in this manner until she has taken a photo of all ten dogs together. Including the photo she took of herself, how many photos did HongVan take?

Q8

How many four-digit numbers have a digit that repeats at least 3 times?

Bonus

Sandy is throwing 88 darts at 9 different dartboards. Every dart she throws hits and sticks to one of the dartboards and each dart is colored exclusively red, yellow, or blue. After Sandy throws all the darts, combinatorics guarantees that one of the dartboards will have at least n darts of the same color. What is the maximum value of n?