**Course:** CS5961/6951 *Computational Statistics* Sp 2010
**Instructor:** R. F. Riesenfeld
**Date:** 9 Feb 2011
**Due:** Friday, 12 Jan 2010

**Assignment 2** *Combinatorics , Averaging Techniques and Payouts*

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**A.** (**Redo** from Assignment 1) Using a kind of pseudo-code, develop and describe an algorithm for creating all the permutations of n distinct objects. Give an example for some small *n* that demonstrates that it works correctly.

**B.** Suppose there is a stack of *n* class tests with the graded scores $0 \le x_i \le 100$ points clearly marked on them, and that you wish to compute the average test score $\overline{x}$ . At first off, you thumb through the stack quickly to get an impression of the grade distribution, and you then guess that 83 is the likely average score. We bear in mind that this is only an initial guess, a working value that is probably close to the true average, but not like to be exactly the class average test score.

Now, to compute the average, you first proceed to work through the stack of tests to record the scores. However, instead of recording the actual scores, you compute and record a statistic,

$$\delta_i = x_i - 83 , \quad i = 1,2,\ldots,n \ .$$

Now, you sum and further process the $\delta_i$ to arrive at the exact average of the scores.

**Problem:** Complete the algorithm so that it computes the average test score, and mathematically justify the correctness of each step. Prove that this algorithm as you have complete constitutes a correct procedure for computing the average test score $\overline{x}$ .

**C.** In basketball, a field goal can result in either 2 points or 3 points, depending on the distance from the basket. Suppose play P has a shooting average of 45% success when shooting from the 2 point range. He is tempted to try to take 3 – point shots because he could contribute more points, on average, when he shoots the ball. However he does not want to lower his average contribution to the score when he takes a shot.

**Problem:** What must his minimum shooting percentage be when he takes a 3 – point shot to insure that his average point contribution to the score is not lowered? Clearly present and explain your calculations in terms of expected value theory.