

# ECE 353 Probability and Random Signals - Homework 3

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**Q1.** An ID includes 10 digits selected uniformly random in range from integral number 0-9. Each number can be selected multiple times. What is the probability that none of the digits is 0, 3,7 if the first digit is not 0?

**Q2.** Suppose a language containing six letters: A, B, C, D, E, F.

- (a) How many three-letter words can you form in this language?
- (b) How many four-letter words can you form if each letter appears only once in each word?
- (c) What is the probability that a three-letter word (with each letter appearing only once) contains E?

**Q3.** Consider a binary code with 6 bits (0 or 1) in each code word. An example of a code word is 010101. In each code word, a bit is a zero with probability 0.7, independent of any other bit.

- (a) What is the probability of the code word 000111?
- (b) What is the probability that a codeword contains exactly three ones?

**Q4.** In a poker-like dice game, five fair 6-sided dice are rolled independently. Consider the following two events: 'four of a kind' - all but one of the dice show the same number (e.g., 46444) and 'a 6-high straight flush' - the five dice outcome contains exactly one of each: 2, 3, 4, 5, and 6 (e.g., 45236)

- (a) Determine the number of possible outcomes in this five dice roll.
- (b) Determine the probability of 'four of a kind'.
- (c) Determine the probability of 'a 6-high straight flush'.