

*Reading Assignment:* Sections 2-3 Papoulis text book assigned in class (4th edition).

**Q1:** (*Papoulis*, Problem 2-11) We select at random  $m$  objects from a set  $B$  of  $n$  objects and we denote the set of selected objects by  $A_m$ . Show that the probability  $p$  that a particular element  $\xi_0$  is in  $A_m$  is equal to  $m/n$ . (*Hint:*  $p$  is equal to the probability that a randomly selected element of  $B$  is in  $A_m$ .)

**Q2:** (*Papoulis*, Problem 2-12) A call occurs at time  $t$ , where  $t$  is a randomly selected point in the interval  $(0, 10)$  (all points in the interval being equally likely). (a) Find  $P(\{6 \leq t \leq 8\})$ . (b) Find  $P(\{6 \leq t \leq 8\}|\{t > 5\})$ .

**Q3:** (*Papoulis*, Problem 2-16) A box contains  $n$  identical balls labeled 1 through  $n$ . Suppose  $k$  balls are drawn in succession (without replacement.) (a) What is the probability that  $m$  is the largest number drawn? (b) What is the probability that the largest number drawn is less than or equal to  $m$ ?

**Q4:** (*Papoulis*, Problem 2-19) A box contains  $m$  white and  $n$  black balls. Suppose  $k$  balls are drawn. Find the probability of drawing at least one white ball.

**Q5:** (*Papoulis*, Problem 2-20) A player tosses a penny from a distance onto the surface of a square table ruled in 1 inch squares. If the penny is  $3/4$  inches in diameter, what is the probability that it will fall entirely inside a square (assuming that the penny lands on the table)?

**Q6:** Suppose, Box 1 and Box 2 have 1000 and 2000 bulbs respectively. Among the bulbs, 10% and 5% of the bulbs from Box 1 and Box 2 respectively, are defective. You randomly select a box and pick two bulbs from it. a) Find the probability that both the bulbs are defective, b) Assuming that both are defective, find the probability that the defective bulbs both came from Box 1.