



1 DEFINITIONS

1. The pmf for a Binomial Random variable $Y \sim (n, p)$ is given by

$$p_Y(Y = k) = \binom{n}{k} p^k (1 - p)^{n-k}, \quad 0 \leq k \leq n \quad (1.1)$$

2. The pdf of an Exponential Random variable X is given by

$$p_X(x) = ce^{-cx} u(x) \quad (1.2)$$

2 PROBLEMS

1. Show that the solution of

$$\max_p p_Y(Y = k) \quad (2.1.1)$$

is

$$\hat{p} = \frac{k}{n} \quad (2.1.2)$$

2. Find

$$\Pr(X > T) \quad (2.2.1)$$

where T is a constant.

3. If X represents the lifetime of a bulb, show that the value of c that maximizes the probability of k out of n bulbs working after T hours is

$$c = \frac{1}{T} \log\left(\frac{n}{k}\right) \quad (2.3.1)$$