

1. A touristic helicopter holds 15 passengers, but the company sells 18 tickets. If the tourists show up independently, but with probability .8, what is the probability that more tourists show up than there are available seats?

2. The lifetime of a lightbulb is exponentially distributed with expectation  $\mu = 500$  hrs. An office has 100 such lightbulbs, whose lifetimes are independent. What is the probability that all 100 lightbulbs in an office are still operating after 50 hours. (Exact value please, not an approximation.)

3. Suppose  $X$  is exponentially distributed parameter  $\mu = 5$  and suppose  $Y = \frac{1}{X}$ . Determine, from the definition, the cdf and pdf for  $Y$ . The answers are exact but don't necessarily match a familiar distribution.

4. The height of high school basketball players in one state has been found to be normally distributed, with mean  $\mu = 190$  cm and  $\sigma = 20$  cm. a) Find the probability that one basketball player has height  $\geq 200$  cm and express in terms of

$$\Phi(t) = \int_{-\infty}^t \frac{1}{\sqrt{2\pi}} e^{-\frac{x^2}{2}} dx$$

b) Five players are chosen at random. What is the probability that three have height  $\geq 200$  cm and two have height  $\leq 170$  cm? (Hint: first call these players  $P_1, P_2, P_3, P_4, P_5$  as they are chosen and allocate "tall" "short" to them. Then calculate the probability of each particular order.)