MATH 371 September 2017

Some practice in recognizing the discrete probability distributions.

Name	Description of random variable	Parameters	$E(Y)$	$V(Y)$
Binomial	number of successes in n independent and identical trials	$p = P(S)$, n	np	npq
Geometric				
Negative Binomial				
Hypergeometric				
Poisson				

Good review for students!

In each of the problems below, answer the question and indicate the correct choice of theoretical probability distribution (including parameter values) to use.

1. Telephone lines at Alaska Airlines are busy 60% of the time.

   (a) Find the probability that you get through on the first try, the second try, the fourth try.

   $X \sim Geom(.6)$ $p(1) = .6$ $p(2) = (.4)(.6)$ $p(4) = (.4)^3(.6)$

   $= .24$ $= .0384$

   (b) Suppose you need to make two phone calls to Alaska Airlines. Find the probability that you succeed in exactly four tries.

   $X \sim$ Negative Binomial $r = 2$ S F F S

   $p(4) = \binom{3}{1}(.4)^2(.6)^2 \approx .173$

2. Suppose a statistician is interested in polling registered voters.

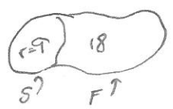
   (a) Suppose 33% of the US population is Republican. In a random sample of 50 individuals from the eligible voting population, what is the probability that exactly 20 of the individuals in the sample will be Republicans?

   $p = P(R) = .33$ $n = 50$ $Binom(50, .33)$

   $p(20) = \binom{50}{20}(.33)^{20}(.67)^{30}$

   (b) Suppose in a class of 27, nine members are Republicans. What is the probability that exactly 4 class members are Republicans, in a random sample of size 10 drawn from the class? (Assume everyone in the class is a registered voter.)

   $N = 27$ $n = 10$ $r = 9$ Hypergeometric

   $p(4) = \dfrac{\binom{9}{4}\binom{18}{6}}{\binom{27}{10}}$ 1