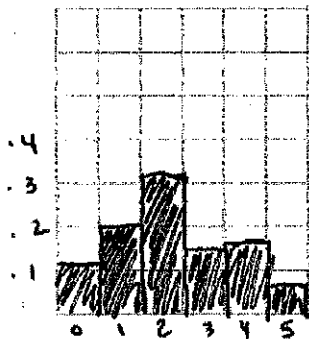1. The probability distribution below is for the random variable X = number of mice caught in traps during a single night in small apartment building.

X	0	1	2	3	4	5
$P(X)$	0.12	0.20	0.31	0.14	0.16	0.07

(a) Make a histogram of this probability distribution in the grid:

(b) Describe $P(X \geq 2)$ in words and find its value.

$P(x \geq 2)$ = probability of at least 2 mice being caught in traps during a single night in a small town Apt.

$$P(x \geq 2) = P(2) + P(3) + P(4) + P(5)$$

$$P(x \geq 2) = 0.68$$

(c) Express the event "trapping at least one mouse" in terms of X and find its probability.

$$P(x \geq 1) = 1 - P(0)$$
$$= 1 - (.12) = .88 = P(x \geq 1)$$

2. The total sales on a randomly-selected day at Joy's Toy Shop can be represented by the continuous random variable S, which has a Normal distribution with a mean of $3600 and a standard deviation of $500. Find and interpret $P(S > \$4000)$.

$$N(3600, 500)$$

$P(S > 4000)$ = The prob. that the total sales on a random day at Joy's toy shop exceeds $4000.

$$z = \frac{4000 - 3600}{500} = 0.8$$

normcdf$(0.8, 10000, 0, 1) = .2119$

3. Joe the barber charges $32 for a shave and haircut and $20 for just a haircut. Based on experience, he determines that the probability that a randomly selected customer comes in for a shave and haircut is 0.85, the rest of his customers come in for just a haircut. Let $J =$ what Joe charges a randomly-selected customer.

(a) Give the probability distribution for J.

Prob(J)	Shave + Haircut	Haircut only
value	$32	$20
prob	0.85	0.15

(b) Find and interpret the mean of J, μ_J.

$$\mu_J = 32(.85) + 20(.15)$$
$$\mu_J = \$30.20$$

The avg. amount of money received by Joe the barber per customer is expected to be $30.20.

(c) Find and interpret the standard deviation of J, σ_J.

Using calc.

$$\sigma_J = \$4.285$$

The avg amount of variation from the mean value per customer is 4.285 dollars.

1. Determine whether each random variable described below satisfies the conditions for a binomial setting, a geometric setting, or neither. Support your conclusion in each case.

(a) Suppose that one of every 100 people in a large community is infected with HIV. You want to identify an HIV-positive person to include in a study of an experimental new drug. How many individuals would you expect to have to interview in order to find the first person who is HIV-positive?

Geometric setting. ① success = has HIV
                              failure = no HIV
② Independent (each person has no influence on another)
③ .01 chance of getting person w/ HIV.

(b) Deal seven cards from a standard deck of 52 cards. Let H = the number of hearts dealt.

without replacement is assumed so this is neither. Trials are deemed not independent.

2. Research suggests that about 24% of 12-year-olds in the United States can pick out the state of Colorado on a map.

(a) What is the probability that you must sample exactly 5 twelve-year-olds to find the first one who can pick out Colorado on a map?

geometric $p = .24$ $x = 5$

* geometricpdf$(.24, 5) = .0801$

or $P(x = 5) = (1 - .24)^{5-1}(.24) = .0801$

(b) What is the probability that you must sample 5 or more twelve-year-olds to find the first one who can pick out Colorado on a map?

* $P(x \geq 5) = 1 - \text{geometcdf}(.24, 4)$
                      $= .334$

or $(.76)^4 = .334$

3. An online poll reported that 20% of respondents subscribe to the "five-second rule." That is, they would eat a piece of food that fell onto the kitchen floor if it was picked up within five seconds. Let's assume this figure is accurate for the entire U.S. population, and we select 15 people at random from this population. $p = .20 \quad n = 15$

(a) Determine the probability that exactly 3 of the 15 people subscribe to the "five-second rule." binomial

$\ast$ binom pdf $(15, .20, 3) = .25$

or $P(F=3) = \left(\dfrac{15}{3}\right)(0.2)^3(0.8)^{12} = .25$

(b) Find the probability that less than 4 people out of 15 subscribe to the "five-second rule."

$P(x<4)$ binom cdf $(15, .20, 3) = .648$

(c) Let F = the number of people in our sample of 15 who subscribe to the "five-second rule." Find the mean and standard deviation for F.

$\mu_F = np$

$\boxed{\mu_F = 15(.2) = 3}$

$\sigma_F = \sqrt{np(1-p)}$

$\boxed{\sigma_F = \sqrt{15(.2)(.8)} = 1.55}$