

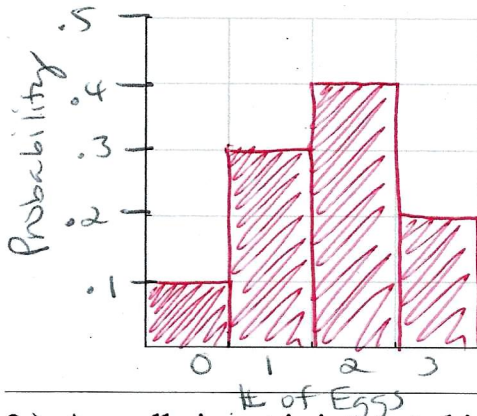
Directions: Read each problem and answer the questions that follow either on the worksheet paper or on a separate sheet (just make sure all questions are answered).

Construct complete and neat histograms and tables.

- 1.) Parus caeruleus is a small, blue, and yellow bird common to Great Britain that always lays three eggs in its nest. The number of eggs, x , which actually hatch has the following probability distribution.

x = number of hatched eggs	0	1	2	3
Probability	0.1	0.3	0.4	0.2

- a.) Make a probability histogram.



- b.) If a nest is selected at random, how many eggs would we expect to hatch?

$$0(.1) + 1(.3) + 2(.4) + 3(.2) = 1.7 \text{ eggs}$$

- c.) What percent of nests have 1 or less eggs hatch?

$$.1 + .3 = .4 = 40\%$$

- d.) What percent of nests have at least 2 eggs hatch?

$$.4 + .2 = .6 = 60\%$$

- 2.) A small airport is interested in the number of late aircraft arrivals per day. Thus, everyday for a year, managers count the daily number of late arrivals.

x = number of late arrivals	0	1	2	3	4 +
Probability	0.118	0.186	.296	0.260	0.140

- a.) What is the probability of the airport having 2 late arrivals a day?

$$.118 + .186 + .260 + .140 = .704 \rightarrow 1 - .704 = .296$$

- b.) What percent will the airport have 3 or more late arrivals?

$$.260 + .140 = .40 = 40\%$$

- c.) How often will there be 1 or less late arrivals?

$$.118 + .186 = .304 = 30.4\%$$

- d.) On any particular day, how many late arrivals would we expect?

$$0(.118) + 1(.186) + 2(.296) + 3(.260) + 4(.140) = 2.118 \text{ late arrivals}$$

- 3.) In 1952, Dr. Virginia Apgar suggested five criteria for measuring a baby's health at birth. Still used today, each category — skin color, heart rate, muscle tone, breathing, and response to stimulation — receives a 0, 1, or 2. Thus, a newborn's Apgar score will be an integer between 0 and 10. The table displays the probabilities for each possible Apgar score.

x = Apgar Score	0	1	2	3	4	5	6	7	8	9	10
Probability	0.001	0.006	0.007	0.008	0.012	0.020	0.038	0.099	0.319	0.437	0.053

- a.) A score of 7 or more indicates a healthy baby: what percentage of newborns are considered "healthy"?

$$.099 + .319 + .437 + .053 = .908 = 90.8\%$$

- b.) What is the expected Apgar score for a randomly selected newborn? Is a typical newborn healthy?

$$0(.001) + 1(.006) + 2(.007) + 3(.008) + 4(.012) + 5(.020) + 6(.038) + 7(.099) + 8(.319) + 9(.437) + 10(.053) = 8.128$$

Yes since $8.128 > 7$

- 4.) The American casino game, Roulette, features a recumbent wheel with 38 "slots" along its circumference. Eighteen slots are red, eighteen are black, and two slots – numbered 0 and 00 – are green. As the wheel spins, a marble is tossed onto it, where it will ultimately land in one of the slots. When a player bets \$1 on red, and the marble lands on red, the players get the dollar back and another \$1 for "winning." Of course, if a player bets on red and the marble lands on another color, the player loses \$1. Thus, since there are only two possible values, we can easily define x as a player's net gain: either +\$1 or -\$1.

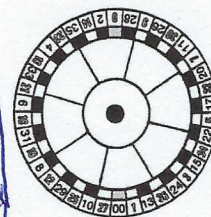
- a.) Make a table showing the possible values for x and their associated probabilities.

	Not Red	Red
x	-1	1
Probability	$\frac{20}{38}$	$\frac{18}{38}$

- b.) Find the expected value for this probability distribution.

What does this say about a player's chances of winning in the long run?

$$-1\left(\frac{20}{38}\right) + 1\left(\frac{18}{38}\right) = -.0526 = \text{player will lose about 5 cents for each game played}$$



- 5.) You are offered the following wager: a single card is drawn from a standard deck of 52 cards. If the card is an Ace, you win \$10; otherwise you lose \$1.

- a.) Make a table showing the possible values for x and their associated probabilities.

x	-1	10
Probability	$\frac{48}{52}$	$\frac{4}{52}$

- b.) If you played this game many, many times, would be your expected financial outcome? (Express your answer in dollars and cents.)

$$-1\left(\frac{48}{52}\right) + 10\left(\frac{4}{52}\right) = -\frac{8}{52} = -.1538 = \text{player will lose 15 cents per game}$$

- 6.) The table below shows the probability distribution for samples of five dentists and the use of nitrous oxide (laughing gas) in their practice.

x = number of dentists using laughing gas	0	1	2	3	4	5
Probability	0.0102	0.0768	0.2304	0.3456	.2592	0.0778

- a.) What is the probability of 4 dentists using laughing gas?

$$.0102 + .0768 + .2304 + .3456 + .0778 = .7408 \rightarrow 1 - .7408 = .2592$$

- b.) If you randomly selected 5 dentists, how many would we expect to use laughing gas?

$$0(.0102) + 1(.0768) + 2(.2304) + 3(.3456) + 4(.2592) + 5(.0778) = 3.0002 \text{ dentists}$$

- c.) What is the probability that no more than 3 of the 5 dentists use laughing gas?

$$.0102 + .0768 + .2304 + .3456 = .663$$

- 7.) Let the output of the random variable x denote the number of defective computer parts in a shipment of 400. The following table gives the probability distribution of function of x .

x = number of defective computer parts	0	1	2	3	4	5
Probability	0.02	0.20	.30	.30	0.10	0.08

- a.) What is the probability of a computer with 2 and 3 defective parts if there probability is the same?

$$.02 + .20 + .10 + .08 = .4 \rightarrow 1 - .4 = .6 \div 2 = .30 \text{ each}$$

- b.) How many shipments have at least 3 defective parts?

$$.3 + .10 + .08 = .48 \times 400 = 192 \text{ shipments}$$

- c.) In a typical shipment, how many defective computer parts would you find?

$$0(.02) + 1(.20) + 2(.30) + 3(.30) + 4(.10) + 5(.08) = 2.5 \text{ computer parts}$$