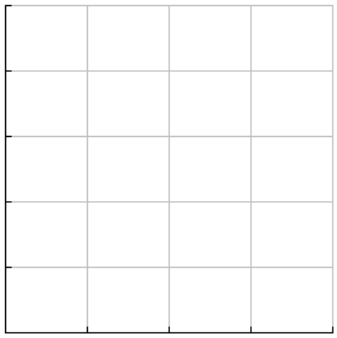
Advanced Functions – Discrete Random Variables WS Name: _____

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?

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

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

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		0.260	0.140

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

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

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

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

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"?

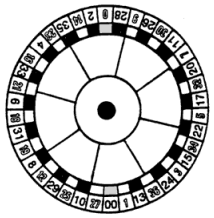
b.) What is the expected Apgar score for a randomly selected newborn? Is a typical newborn healthy?

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.

x		
Probability		

b.) Find the expected value for this probability distribution. What does this say about a player's chances of winning in the long run?



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		
Probability		

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

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		0.0778

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

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

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

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			0.10	0.08

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

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

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