This paper follows a penguin named Duckie that is doing research and creating research problems to solve with the data he collected. Some of these problems may involve the actual numbers from the data set or may involve the names and genders from the data set. Each problem has the solution below the problem, and it has been worked out to some extent. A problem from every chapter/ section has been created and some may have been skipped due to confusion about what was covered and what was not covered. The first question presents the data that was used in this paper.

Duckie gathered data of 100 baby names in 2023 and put them into percentage form. Of those 100 names he would like to find the mean and standard deviation of 10 of those names. He has provided the numbers below:

1.14, 0.87, 1.04, 0.77, 0.81, 0.72, 0.64, 0.70, 0.63, and 0.68

Mean:

1.14+0.87+1.04+0.77+0.81+0.72+0.64+0.70+0.63+0.68= 8

8/10=0.8

The mean is 0.8

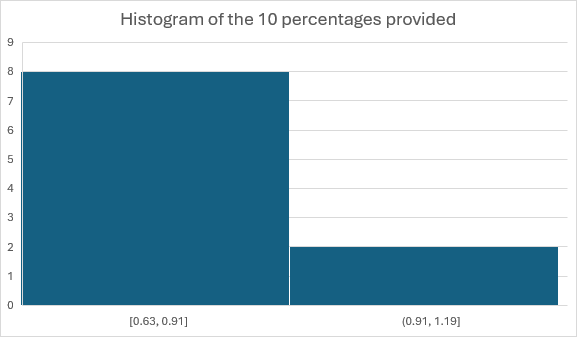
Standard deviation:

0.1156+0.0049+0.0576+0.0009+0.0001+0.0064+0.0256+0.01+0.0289+0.0144=0.2644

0.2644/9=0.02937

The standard deviation is 0.1714

Duckie also would like to create a histogram of those 10 percentages



From those 100 names that Duckie collected the data on he chose 60 of those names at random

36 of those names were males, 9 of them were females, and 3 of the names started with an L.

How many were males, females, or both?

36+9-3= 42

How many were males with a name that started with an L?

36-3= 33

How many were females that have a name that started with an L?

60-42= 18

Duckie chose 6 males and 7 females from the data and wants to know how many possible arrangements he can make with them? He can make 42 different arrangements

Of those 100 top names form Duckies data the top 4 are Liam, Olivia, Noah, and Emma. The percentages of those names are 1.14, 0.87, 1.04, and 0.77 respectively. A single person is chosen at random

Make a list of the sample space for this : Liam, Olivia, Noah, Emma

Make use of the information given above to assign probabilities to each of the sample events:

Liam 1.14, Olivia 0.87, Noah 1.04, Emma 0.77

What is the probability that the person chosen at random is either named Liam or Noah:

1.14+1.04= 1.18

Duckie gives a test to the small children in the data set and asks them to match each of three pictures of animals to the word identifying that animal. If a child assigns the three words at random to the three pictures, what is the probability distribution for Y, the number of correct matches.

There is a total of 3! ways to assign the words to the picture or 6 ways in normal terms

So, the probability distribution for the number of correct matches is:

Duckie finds that there is a procedure that is successful with a probability of p. The operation is performed 5 times on the children from the data set and the results are independent of one another. What is the probability that

1. All five operations are successful if p=.8
2. Exactly four are successful if p=.6
3. Less than two are successful if p=.3

Suppose that 30% of the applicants for a highly regarded day care possess the qualities that are being looked for. The parents of these children are interviewed and are selected at random from the pool. What is the probability that the first applicant with the needed qualities is found on the fifth interview? What is the expected number of applicants who need to be interviewed to find the first one with the qualities they are looking for?

p=.30 and q= 1-p=1-.30=.70

The probability that the first success occurs on the 5th trial is:

= 0.07203

The expected value E(X) of the geometric distribution is:

So, the expected number of applicants who need to be interviewed in order to find the first one with the qualities that are being looked for is approximately 3.33

Duckie was given a problem to solve, A class contains 10 children, 4 of which are male. The school administrator selects 5 of the children at random, thinking they are all female. What is the probability that all five of the children are female?

Duckie was told to let Y denote a random variable that has a Poisson Distribution with the mean he calculated earlier which was 0.8. He was told to find

Duckie was given a joint probability function associated with data obtained in a study of automobile accidents in which a child (under age of 2 years) was in the car and at least one fatality occurred. Specifically, the study focused on whether the child survived and what type of seatbelt (if any) he or used. Define

and

Notice that is the number of fatalities per child and, since the children’s car seats utilize two belts, is the number of seatbelts in use at the time of the accident.

|  |  |  |  |
| --- | --- | --- | --- |
|  | 0 | 1 | Total |
| 0 | .38 | .17 | .55 |
| 1 | .14 | .02 | .16 |
| 2 | .24 | .05 | .29 |
| Total | .76 | .24 | 1.00 |

1. Verify that the preceding probability function satisfies Theorem 5.1

0.38+0.17+0.55+0.14+.02+0.16=1.00

1. Find , What is the interpretation of this value?

F(1,2)= 0.38+0.17+0.55+0.14+0.02+0.16=1.00

This is accounts for the possible outcomes in the data set.