Data Analysis and Business Analytics

**Competency 2 – Reflection**

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**What is a random variable?**

A random variable is a function or rule that assigns a numerical value to each outcome. A random variable is often a result of an observational experiment. There are two different types of variables a discrete and continuous. A discrete variable has a countable number of distinct values, or in other words a discrete value is obtained by counting. A continuous variable is a variable obtained by measuring. An example of a discrete variable is counting by 0, 1, 2, 3, 4, and so on. A continuous variable can be an infinite number with different values such as 0.00, 0.5, 5.23, 15.2.

**How would you differentiate a discrete from a continuous random variable?**

According to the Khan Academy, A discrete random variable can only be a finite number of values. An example of this is the roll of a dice, which the outcome is a discrete random variable since it has six sides that it can land on. The continuous random variable can take on the value in a given interval. An example of a continuous variables is in measuring temperature where ewe can have decimals when taking measurement and the temperature can be anywhere within range of the thermometer. (Khan, n.d.)

**A laptop manufacturing company has implemented a 2-step process to test the quality of each production batch. In the first step, a technician randomly selects 15 laptops from the batch and determines whether they meet specifications. The batch is considered acceptable provided no more than 1 laptop fails to meet specifications. Otherwise, the entire batch has to be tested in the second step. Historical data shows that 95% of the laptops produced adhere to specifications.**

**What are the 4 characteristics of a binomial experiment?**

In a binomial experiment there must be a fixed number of trials., each trial is independent of others, there are only two outcomes, and the probability of each outcome remains constant from trial to trial (*Chapter 6*, n.d.)

**Can we use a binomial distribution to model this process?**

We can get the number of tries of the 15 laptops to determine if they meet specifications, these are our successes. If one laptop is a failure this equals our failure. The outcome of the tests is random, and we can set the probability to 95% for the process. Since the probability remains the same through the process of determining failures, we should be able to use the binomial distribution model.

**What is the probability that the entire batch unnecessarily has to be tested if in fact 95% of its laptops conform to specifications? (Hint: Use Excels =BINOMDIST() function to find the probability)**

Graphical user interface, application, table, Excel

Description automatically generated

**What is the probability that the batch is incorrectly accepted if only 75% of its laptops actually conform to specifications?**

Graphical user interface, chart, application

Description automatically generated with medium confidence

**What situations in your organization might this type of analysis apply to? Explain.**

Where I work, I can see our IT customer service team using this to find out the actual number of laptops that they provide to our users that are failures. Sometime when you get a laptop from your office, they image the laptop with the approved image. But what if that image was installed correctly but in the time that the ITCS group finished the install to the time that it’s shipped to the user for actual use what could be the failure rate of these images. Management would like to find out the percentage of failures they have with their groups.

**Reference:**

Khan, S. (n.d.). *Discrete and continuous random variables*. www.khanacademy.com. Retrieved March 10, 2024, from <https://www.khanacademy.org/math/statistics-probability/random-variables-stats-library/random-variables-discrete/v/discrete-and-continuous-random-variables#:~:text=Discrete%20random%20variables%20can%20only,value%20in%20a%20given%20interval>.

*Chapter 6*. (n.d.). <https://faculty.elgin.edu/dkernler/statistics/ch06/6-2.html>