

Some Class Activities in Probability and Statistics

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Abstract

We share several examples and class activities designed for students to understand probability as a relative frequency through experimentation and simulation, and understand the law of large numbers as the bridge to theoretical probabilities. As well, we present some data collection activities used in class for examples of topics in descriptive statistics.

Summary

We offer a course titled Introduction to Probability and Statistics. While there is nothing unique about that name, the composition of students drives this course in that the majority of the students are majoring in elementary education. This course satisfies a general education university requirement, yet also provides a required content course in the area of mathematics for these students. This course is about half probability and half statistics, but our focus in the spotlight session is predominantly on probability.

The Kentucky Department of Education publishes a Program of Studies to help ensure that all students across the commonwealth are provided with a common content and have opportunities to learn at a high level. The Program of Studies also outlines the minimum content required for all students before graduating from Kentucky high schools as well as the primary, intermediate, and middle level programs leading up to these requirements.

Particular to probability and statistics, of the objectives for Primary through Grade 5 in the Program of Studies include, but are certainly not limited to:

- Explore chance as illustrated in games and experiments.
- Explore basic concepts of probability through simple experiments.
- Collect and display data in graphs.
- Pose questions; collect, organize, and display data.

With this backdrop we strive to have our students see the importance of understanding probability at a reasonably deep level. To that end our coverage of probability is introduced and enhanced with experimentation and simulation of activities. We believe this leads to better understanding of experimental probability, the law of large numbers, and theoretical probability. A few examples follow.

Examples

1. “Yahtzee”

Using a relative frequency approach in a class activity, we attempt to find the probability of achieving “Yahtzee” in the well known dice game.

2. “Hat Check” Experiment:

Four players turn in their hats; the hats are mixed up randomly and then returned.

After demonstrating a few times, we use the results of “many” repetitions of the experiment to answer the following questions:

- A. Make a frequency table for the number of hats correctly returned.
- B. What is the relative frequency probability that no one gets their hat returned correctly? (that they all get their hat returned correctly?)
- C. What is the empirical probability player #1 gets his hat returned correctly?
- D. Repeat part C for player 3.
- E. What is the theoretical probability no one gets their hat returned correctly?
- F. How many players would you “expect” to get their hat returned correctly?

Other examples and materials will be available at the conference.