

Worksheet – Sections 5.4-6.1

Law of Large Numbers: if an experiment with a random outcome is repeated a large number of times, the empirical probability of an event is likely to be close to the true probability. The larger the number of repetitions, the closer together these probabilities are likely to be.

Discrete or continuous random variable: you can list all values of a *discrete* variable as a finite or infinite sequence. You cannot do so with a *continuous* variable.

Probability distribution function (pdf): a representation that shows you all possible values of a random variable and the probability that each value occurs. A pdf can be represented in table format (discrete variable) or graph (discrete or continuous variable).

1) Use StatCrunch (Applets → Simulation → Coin flipping) to simulate 1000 coin flips with $P(\text{Head}) = 0.65$.

(a) What is the theoretical probability of getting Head? What is the true probability of getting Head?

(b) Based on this simulation, find the proportion of Heads up to the 100th, 400th, 1000th run. What are the empirical probabilities of getting Head in 100, 400, 1000 trials?

(c) Run another 2000 coin flips. Based on this simulation, find the proportion of Heads up to the 2000th, 3000th run. Does what you observe seem to be consistent with the Law of Large Numbers?

2) Determine whether each of the following variables can be modeled as continuous or discrete.

(a) the number of text messages you receive in one day

(b) the amount of time, in seconds, it takes a runner to finish a 100-meter race

(c) the number of defective light bulbs in a box of 50 light bulbs

(d) the weight, in grams, of a randomly chosen apple

(e) the height of a person in centimeter

3) A bus company records how many minutes late a bus is during the morning route, rounded to the nearest minute. Let X be number of minutes late for a randomly selected morning bus. Make a graph of the pdf for X .

X	0	1	2	3	4
Probability	0.4	0.25	0.18	0.1	0.07

4) A public library tracks how many books people check out during one visit. Let X be the number of books checked out by a randomly selected visitor. Show the pdf of X in table format.

