

# Homework 1

BSTA 550

Due 10/12 at 11pm

## Directions

**Please turn in this homework on Sakai.** Please submit your homework in pdf format. You can type your work on your computer or submit a single file with photos of your written work or any other method that can be turned into a pdf. The Adobe Scan phone app is an easy way to scan photos and compile into a PDF. Please let me know if you greatly prefer to submit a physical copy. We can work out another way for you to turn in homework.

**Try to complete all of the problems listed below at some point this quarter! You may want to save some of them for studying later!** Only turn in the ones listed in the “Turn In” column. Please submit problems in the order they are listed.

*You must show all of your work to receive credit.*

## Questions

### 1. Outcomes, events, and sample space

In the below parts, please list (i) one specific outcome, (ii) one event that contains more than one outcome, and (iii) the sample space.

- a. Chris has an 5-pack of Gatorade sports drink: 1 orange, 2 lemon-lime, and 2 fruit punch. He blindly grabs one out of the pack over and over if necessary, without replacement, until he finds an orange one. Note, each lemon-lime is indistinguishable, and each fruit punch is indistinguishable.
- b. A claw machine contains 10 plush toys: 5 Red Squishies (R), 3 Blue Dinosaurs (B), and 2 Yellow Star Puffs (Y). You successfully grab a toy, remove it, and then grab a second toy (sampling without replacement). The result is the ordered pair of the two toys' colors.

- c. You are opening a series of [mofusound Cat blind boxes](#). There are 4 possible figurines to collect: 1 shark cat (S), 1 orange striped fish cat (O), and 1 hen cat (H), and 1 cow cat (C). You buy a single blind box.

## 2. Running a simulation!

This assignment requires you to use the four-step simulation process in R to approximate the probability of a specific event.

**Scenario: The Mystic Orb Blind Boxes** The “Mystic Orb” collectible series has 5 total figures you can find in the blind boxes:

- 1 Rare Mystery Toy (M) - The figure Nicky wants.
- 4 Common Figures (C) - All other figures.

When you buy a blind box, you receive one of the 5 figures, and each figure is equally likely.

Nicky decides to buy three Mystic Orb blind boxes. She really wants to get the Rare Mystery Toy!! The random variable of interest is  $X$ , the number of boxes out of the three that contain the Rare Mystery Toy.

Using the four-step simulation process, approximate the probability that Nicky gets at least one Rare Mystery Toy when she buys three boxes.