

Simulation Project 2

The Game pitching pennies. How you play: Any number of players line up a fixed distance away from a wall. The players each take a coin of common denomination and take turns tossing them towards the wall. The objective is to throw the coins such that they land as close to the wall as possible without hitting it. Rolling is forbidden.

I want you to play this game standing 15 feet from a wall with flooring that is NOT carpet. Play the game at least 40 times, each time measuring (and recording) the distance from the wall to your coin's final resting place. Measure to the nearest 16th of an inch. Any attempt that hits the wall is a foul and does not count; reattempt the toss.

Only collect the data on your play.

You are to turn in a word document responding to Parts 1 – 5 of this assignment. You need to provide a **paragraph** describing how you completed each part along with your work (I explain what I expect to see for each part).

Part 1: Record your data.

Provide a table and histogram of your recorded data.

Part 2: Hypothesize and fit a distribution to your data. If you try 3 tests and you always reject, use the distribution with the lowest P-Value. **YOU MUST CONDUCT AT LEAST ONE Chi-Square Goodness of Fit Test AND ONE Kolmogorov-Smirnov Goodness of Fit Test.** You can use your data to determine your parameters. For example, I'm not very good at this game and out of 40 attempts, my penny fell an average of 5.25 inches from the wall. My best was 3 and my worst was 10 inches. My standard deviation was 1.16 inches. Now I can conduct my goodness of fit test. Feel free to use technology.

Provide your null and alternative hypothesis, parameters, and p-value (or Test Statistic and Critical Value) for all hypothesis tests performed and which distribution is your champion.

Part 3: Build a simulation that can simulate your play 100 times (replications). It should output distance from the wall with **continuous** accuracy. You can use Excel, or R.

Provide your model and your results.

Part 4: Compare your simulation to your original data. Do you feel you have modeled this phenomenon well?

Provide a paragraph explaining.

Part 5: Expand your simulation to a weapon's accuracy. Use your simulation – not the original data you created from your game. Assume any attempt outside of 3 inches is automatically not lethal. However, any attempt within 3 inches has a 65% chance of being lethal. Run this model 100 times and determine the lethality rate. How many shots would you recommend we use to feel confident we kill a target?

Provide your new model and a paragraph with a graphic summarizing your results.