

Practice Assignment: Probability

- 1) Select the values that can represent a valid probability of an event. Choose all that apply.
- a) 0.80
 - b) $\frac{5}{6}$
 - c) 1.21
 - d) -0.23
 - e) 1
 - f) $\frac{10}{7}$
 - g) 20%

Answer: a, b, e, g

- 2) Suppose your friend flips a coin 10 times and sees that it landed on heads six times. Based on this chance experiment, your friend says that the probability of the coin landing on heads is 60%.

Part A: Is your friend referring to an empirical probability or a theoretical probability?

Answer: Empirical

Part B: Since the simulated probability was 60%, your friend declares that the coin is unfair. Do you agree? Explain.

Answer: No, because there is a lot of variation in the simulated probabilities with a small number of simulations.

- 3) Suppose your friend flips a coin 1,000 times and sees that it landed on heads 600 times. Based on this chance experiment, your friend says that the probability of the coin landing on heads is 60%.

Part A: Is your friend referring to an empirical probability or a theoretical probability?

Answer: Empirical

Part B: Since the simulated probability was 60%, your friend declares that the coin is unfair. Do you agree? Explain.

Answer: Yes, because there are a lot of simulations, and according to the Law of Large Numbers, the empirical probability will approach the value of the true probability.

- 4) You forgot to study for your midterm exam. Your midterm consists of a multiple choice test with a total of five possible answer choices for each question (A through E).

Part A: List the possible outcomes for each question.

Answer: {A, B, C, D, E}

Part B: If there is one correct answer and four incorrect answers for each question, what is the probability of guessing correctly on one question?

Answer: $1/5 = 0.20$

Part C: What is the probability of NOT guessing correctly on one question?

Answer: $1 - 1/5 = 4/5 = 0.80$

Part D: Using this strategy, how many questions would you anticipate answering correctly on a 20-question test?

Answer: 4

Part E: Suppose your teacher always includes one answer choice that is easily identified as incorrect. What is the probability of guessing correctly on one question if one answer choice is eliminated?

Answer: $1/4 = 0.25$

- 5) Use the *DCMP Random Number Generator* to simulate the results of a 20-question test where a student is guessing the correct answer from four different answer choices (one answer is correct and the other three are incorrect).

Direct link: <https://lumen-learning.shinyapps.io/randomnumbers/>

Part A: Describe your strategy for simulating the test results using the *DCMP Random Number Generator*.

Answers will vary but should include a description of what numbers are assigned to “correct” and which are assigned to “incorrect.” One example would be to simulate a

number between 1 and 4 20 times, where 1 represents a correct answer and 2, 3, and 4 represent an incorrect answer.

Part B: Provide the simulated outcomes for each question of your simulated 20-question test.

Answers will vary.

Sample answer:

4 4 1 3 4 3 2 3 1 3 2 2 1 4 4 4 3 4 4 4

Part C: How many questions were answered correctly in your simulated test?

Answers will vary.

Sample answer: $3/20 = 0.15 = 15\%$

Part D: How close to the theoretical probability was your simulated probability?

Answers will vary.

Sample answer: 0.15 is not really that close to the true probability of 0.25.