

Question #1

A box contains 2 balls numbered 2 and 3. You reach into the box and randomly choose 2 balls with replacement (the first ball is placed back into the box before the second selection is made). Let the random variable X be the sum of the numbers written on the 2 selected balls. Find

- (a) Find the probability distribution of X .
- (b) Find and interpret the mean and standard deviation of X .

Question #2

1. The times (in seconds) for three women's bobsled teams from the 2002 Salt Lake Winter Olympic Games are given in the following table:

97.76	99.35	100.74
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- (a) For samples of size two, construct the sampling distribution of the sample mean.
- (b) The sampling distribution constructed in part (a) is a probability distribution and a random variable must be defined to produce the probability distribution. What is the random variable in this case?

Question #3

1. The Massachusetts Bay Transportation Authority (MBTA) Green Line from Eliot to Lechmere in Boston has trolleys leaving regularly throughout the day beginning at 5:00 am. Although the length of the trip and the number of stops are constant, the time taken for each trip varies due to weather, traffic, and time of day. According to the MBTA, the mean time taken for the trip is 50 minutes. Suppose the travel time is normally distributed with standard deviation 4 minutes. A random sample of 25 trips is obtained, and the time for each is recorded.

- (a) Find the probability the sample mean time will be less than 48 minutes.
- (b) Find the probability the sample mean will be within one minute of the population mean.
- (c) How would the answer in (b) change if the travel time is not normally distributed.

Question #4

The heights of a certain population of corn plants follow a normal distribution with mean 145 cm and standard deviation 22 cm. Suppose we were to choose at random from the population samples of 16 plants each. If possible, answer the following question. If not possible, explain.

- (a) What percentage of the samples have sample mean height between 135 and 155 cm?
- (b) Find the height of the corn plant that corresponds to the 90th percentile.

Question #5

For each number in red, determine if it is a parameter or statistic

(a) In a study about Ohio households, the median household income in Ohio was \$70,784 in the year 2021 according to data collected from U.S. census.

(b) According to a campus survey, 48% of students stated Cancun is the place they plan to visit next.

(c) Okinawa, nicknamed by some the land of immortals, has more than 400 centenarians. A researcher reached out to 3 centenarians in Okinawa and discovered that on average, their diet consists of 58% carbs, 15% protein, and 28% fat.

(d) An analysis was conducted on the 2022 NBA draft, where a total of 58 players were drafted. Out of all drafted players, roughly 19% (11 out of 58) are international.