

Question 1

An executive of Vittoria Communication claims that 50 percent of all cable TV customers subscribe to at least one premium movie channel. In an effort to support her claim, she will pick a randomly selected sample of cable TV customers.

Assume that the executive's claim is true, and she will pick a randomly selected sample of four cable TV customers.

(a) What is the probability that three cable TV customers subscribe to at least one premium movie channel?

(b) What are the mean and standard deviation of cable TV subscribers?

(c) Assume that when we survey twenty randomly selected cable TV subscribers, we discover that exactly five cable TV customers actually subscribe to at least one premium movie channel. Do you believe the executive's claim? Explain your answer with the supporting probability calculations.

(d) Assume that the executive's claim is true, and she will pick a randomly selected sample of twenty cable TV customers. What is the probability that between eight and twelve (exclusive) cable TV customers subscribe to at least one premium movie channel?

Question 2

An experiment investigated whether the stem diameters of a tulip would change depending on whether the plant was left swinging freely in the wind or was artificially supported. Suppose that the unsupported stem diameters of the tulip plant have a normal distribution with an average diameter of 25 mm(millimetres) and a standard deviation of 2 mm.

- a) If two tulip plants are randomly selected, what is the probability that both plants will have a stem diameter of more than 28 mm?
- b) Suppose the population mean of unsupported stem diameter of the tulip plant is unknown with a standard deviation of 2 mm, and the probability that unsupported stem diameter of the tulip plant is more than 22 mm is 99%. Calculate the population mean of unsupported stem diameter of the tulip plant.
- c) It is known from historical records that the proportion of artificially supported tulip plants that have a stem diameter change is forty two percent. If a sample of 140 artificially supported tulip plants are selected at random, what is the probability that more than thirty percent of the artificially supported tulip plants are with a changed diameter?
- d) Another experiment was also conducted in another journal. Suppose that the unsupported stem diameters of the tulip plants are normally distributed with an average diameter of 25 mm (millimetres) and a standard deviation of 2 mm, while artificially supported stem diameters of the tulip plants are normally distributed with an average diameter of 28 mm and a standard deviation of 3 mm. What is the probability that the average diameter of 6 randomly selected unsupported stems of tulip plants is 1 mm wider than the average diameter of 4 randomly selected artificially supported stems of tulip plants?

Question 3

Part I

A bakery sells homemade bread by the loaf and sales are uniformly distributed between 200 and 600 loaves per day.

- a. Find the probability of selling 240 loaves on a given day.
- b. Find the probability of selling between 250 and 260 loaves per day

Part II

The golf balls produced by TruGolf have a mean distance of 250 meters and a variance of 625 meters².

- c. How large a sample of TruGolf balls should be taken if they want to estimate with 90% confidence the mean distance to within 8 meters?
- d. A random sample of 40 balls from TruGolf are selected. Find the Bound of Error when the confidence level is 95% for TruGolf.