Exercises: Oct. 22 and 24

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1. A stem-and leaf diagram retains all the information of the original raw data (true or false)

2. If two events A and B are mutually exclusive and $P(A) \neq 0$ and $P(B) \neq 0$, then they are not independent (true or false)

3. For any set of observations, what is the sum of the deviations of the observations from their mean ? ( )

4. The universe or totality of items or observations under consideration in a statistical study is ( ).

5. A summary measure that is computed to describe a characteristic of an entire population is called a ( ) and a descriptive measure of a sample is called a ( ).

6. The probability that a man will be alive in 25 years is $\frac{3}{5}$ and the probability that his wife will be alive in 25 years is $\frac{2}{3}$. Assume that event of 1 being alive is independent of whether the other is alive or not. Find the probability that in 25 years.

   a. both will be alive

   b. only the man will be alive

   c. at least one of them will be alive

7. A sporting goods store estimates that 20% of the students at a nearby university ski downhill and 15% ski cross-country. Of those who ski downhill, 40% also ski cross-country.

   a. What percentage of the university students ski both downhill and cross-country ?

   b. If a student ski cross-country, what is the probability that they ski downhill ?

   c. What percentage of the university students do not ski at all ?

   d. Are the events of skiing downhill and skiing cross-country independent ? Justify your answer.

   e. Are the events of skiing downhill and skiing cross-country mutually exclusive ? Why ?

8. If a person with tuberculosis (T.B.) is given a chest x-ray, the probability that his condition will be detected is 0.95. If a person without T.B. is given a chest x-ray, the probability that he will be diagnosed incorrectly as having T.B is 0.002. Suppose that 0.1% of the population in a certain city has T.B. If a person is selected at random from this population and diagnosed as having T.B on the basis of a chest x-ray, what is the probability that he actually has T.B. ?

- topic 1
  - observational study v.s experimental study
  - population v.s. sample
  - parameter v.s. statistic
  - sampling methods: SRS, systematic sampling, stratified sampling, cluster sampling, multistage sampling
  - variables: qualitative (or categorical) variable, quantitative (or numerical) variables (discrete and continuous variables)
  - displaying quantitative data: stem-and-leaf plot, histogram (frequency and relative frequency histograms), boxplot
  - mean, mode, median, variance, standard deviation, percentile, quartiles, inter-quartile range
  - symmetric, skewed to the right, skewed to the left, outliers (mild and extreme outliers from a boxplot), empirical rule
- topic 2
  - scatter plot
  - correlation coefficient
  - least squares line
  - coefficient of determination
  - interpretations and predictions
- topic 3 and 4
  - sample space, event, probability
  - complement rule, additive rule, mutually exclusive, multiplicative rule
  - permutation, combination
  - conditional multiplicative rule, conditional probability, independency
- topic 5
  - random variable
  - probability distribution of a random variable
  - joint probability distribution
  - marginal probability distribution
  - conditional probability distribution, independency
  - mean (expected value) and variance of a random variable
  - some rules about the mean and variance