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**Statistics Exam**

**Question 1.**

A potential candidate for a political position in some state is interested to know what are her chances to win the primaries of her party and be selected as parties candidate for the position. In order to examine the opinions of her party voters she hires the services of a polling agency. The polling is conducted among 500 registered voters of the party. One of the questions that the pollsters refer to the willingness of the voters to vote for a female candidate for the job. Forty two percent of the people asked said that they prefer to have a women running for the job. Thirty eight percent said that the candidate’s gender is irrelevant. The rest prefers a male candidate. Which of the following is (i) a population (ii) a sample (iii) a parameter and (iv) a statistic:

1. The 500 registered voters.

Sample

1. The percentage, among all registered voters of the given party, of those that prefer a male candidate.

Parameter

1. The number 42% that corresponds to the percentage of those that prefer a female candidate.

Statistic

1. The voters in the state that are registered to the given party.

Population

**Question 2.**

**Birth Weight Dataset**

Dataset available from the **previous assignment**. This data set includes the birth weight (in grams) of 189 newborn babies along with some characteristics (e.g., age, smoking status) of their mothers. The data were collected in 1986 at Medical Center in the US.

**Variable description**

The data set includes the following variables:

• low : indicator of birth weight less than 2.5 kg (0 =  normal birth weight, 1 =  low

birth weight).

• age : mother’s age in years.

• lwt : mother’s weight in pounds at last menstrual period.

• race : mother’s race (1 =  white, 2 =  African-American, 3 =  other).

• smoke : smoking status during pregnancy (0 =  not smoking, 1 =  smoking).

• ptl : number of previous premature labors.

• ht : history of hypertension (0 =  no, 1 =  yes).

• ui : presence of uterine irritability (0 =  no, 1 =  yes).

• ftv : number of physician visits during the first trimester.

• bwt : birth weight in grams

1. Use of R to compute the mean and median for the birthweight data

Mean = 2944.286 grams

Median = 2977 grams

1. State steps involved in hypothesis testing
   1. **State the hypothesis**
   2. **Identify the test statistic and its probability distribution**
   3. **Set the significance level**
   4. **State the decision rule**
   5. **Collect data and perform calculations**
   6. **Make a statistical decision**
   7. **Make the economic decision**

**Hypothesis Testing Practical**

1. What proportions of total births were to mothers that were smokers?

74 out of 189 births

1. What proportion of total births was of babies that were classified as low birth weight?

59 out of 189 births

1. Make a contingency table of low birth weight vs. Smoke
2. Conduct a hypothesis test to answer the following question:

* Do smokers and non-smokers give birth to low-birth-weight children at the same rate?
  + State the hypotheses for this research question
  + Test the hypothesis using R
  + What is the conclusion of the hypothesis test based on this p-value?

1. To investigate the difference between the average weights of hypertensive mothers. Conduct a hypothesis test to answer the following question: is there a difference between the average weights of male and female babies?

* State the hypotheses for this research question
* Make a box plot of weights by hypertension status of the mother. Does it appear that there is a difference between the weights of babies born by the two groups of mothers?
* What is the conclusion of your hypothesis test?

**Question 3.**

The ages. in years. of the faculty members of a university biology department are 32.2, 37.5, 41.7. 53.8. 50.2. 48.2. 46.3. 65.0. and 44.8.

(a) Calculate the mean age of these nine faculties members.

46.63333 years

(b) Calculate the median of the ages.

46.3 years

(c) If the person 65.0 years of age retires and is replaced on the faculty with a person 46.5 years old. what is the new mean age?

44.57778 years

(d) What is the new median age?

46.3 years