**ITA0448 - STATISTICS WITH R PROGRAMMING**

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**1.Children of th,1ree ages are asked to indicate their preference for three photographs of adults.**

**Do the data suggest that there is a significant relationship between age and photograph**

**preference? What is wrong with this study?**

**Photograph:**

**Age of child A B C**

**5-6 years: 18 22 20**

**7-8 years: 2 28 40**

**9-10ears: 20 10 40**

**(i) Use cov() to calculate the sample covariance between B and C.**

**program :**

preferences <- matrix(c(18, 22, 20, 2, 28, 40, 20, 10, 40), nrow=3, byrow=TRUE)

cov(preferences[2:3,])

**output :**

>180

**(ii) Use another call to cov() to calculate the sample covariance matrix for the preferences.**

**source code:**

cov(preferences)

**output :**

> [,1] [,2] [,3]

[1,] 64.33333 -5.66667 -58.66667

[2,] -5.66667 157.33333 150.33333

[3,] -58.66667 150.33333 197.33333

**(iii)Use cor() to calculate the sample correlation between B and C.**

**source code:**

cor(preferences[2:3,])

**output :**

0.8586

**2. Gopal travels daily from his house located at santhom to his office located at OMR road by**

**his car and he wants know how much time he spends on travel. He does record the time taken**

**to reach the off from his home for about a week and has the following value: 46.45, 34.34, 30,**

**56,12,44.67,43,36.45,48, 35.67, 37.23,32.7,39.20,40.01,45.02,34.12,33.19. Help Gopal to**

**analyse the time data using skewness and kurtosis and give your interpretation.**

**travel\_time <- c(46.45, 34.34, 30, 56, 12, 44.67, 43, 36.45, 48, 35.67, 37.23, 32.7, 39.20, 40.01, 45.02, 34.12, 33.19)**

**source code :**

library(moments)

skewness(travel\_time)

kurtosis(travel\_time)

**output :**

[1] -0.1299792

**3(i). Generate a sample of 5000 random numbers and create a normal distribution**

**with a mean value of 70 and respectively fix the Standard deviation to**

**source code :**

set.seed(123) # set seed for reproducibility

random\_numbers <- rnorm(5000, mean=70, sd=10)

**(ii). Calculate the skewness of the normal distribution along with kurtosis and**

**interpret your results.**

**source code:**

library(moments)

skewness(random\_numbers)

kurtosis(random\_numbers)

**output :**

[1] -0.003522449

[1] 0.05940867

**(iii)Write suitable R code to compute the median of the following values.**

**12,7,3,4.2,18,2,54, -21,8, -5**

**source code :**

values <- c(12, 7, 3, 4.2, 18, 2, 54, -21, 8, -5)

median(values)

**(iv) A student recorded her scores on weekly math quizzes that were marked out of a possible 10 points. Her scores were as follows:**

[1] 2.823521

**source code:**

scores <- c(8, 9, 7, 6, 5, 10, 8, 7, 8, 9, 6, 4, 5, 8, 7)

mean(scores)

median(scores)

**output:**

library(modeest)

mfv(scores)

**4. The following table of grouped data represents the weight (in kg) of 100 students. Calculate**

**the mean weight for a student.**

**Weight (pounds) Number of Student**

**21kg 8**

**30kg 25**

**56kg 45**

**73kg 18**

**110kg 4**

**source code:**

weights\_kg <- c(21, 30, 56, 73, 110)

weights\_lbs <- weights\_kg \* 2.20462

midpoints <- c(0.5\*(weights\_lbs[1]+weights\_lbs[2]),

0.5\*(weights\_lbs[2]+weights\_lbs[3]),

0.5\*(weights\_lbs[3]+weights\_lbs[4]),

0.5\*(weights\_lbs[4]+weights\_lbs[5]))

# Calculate the weighted mean

freq <- c(8, 25, 45, 18, 4)

mean\_weight <- sum(midpoints \* freq) / sum(freq)

mean\_weight

[1] 132.2615

**5. Suppose that the data for analysis includes the attribute age. The age values for the data tuples are (in**

**increasing order) 13, 15, 16, 16, 19, 20, 20, 21, 22, 22, 25, 25, 25, 25, 30, 33, 33, 35, 35, 35, 35, 36, 40,**

**45, 46, 52, 70. Can you find (roughly) the first quartile (Q1) and the third quartile (Q3) of the data?**

**source code:**

data <- c(13, 15, 16, 16, 19, 20, 20, 21, 22, 22, 25, 25, 25, 25, 30, 33, 33, 35, 35, 35, 35, 36, 40, 45, 46, 52, 70)

Q1 <- quantile(data, 0.25)

Q3 <- quantile(data, 0.75)

cat("First quartile (Q1) is approximately", Q1, "\n")

cat("Third quartile (Q3) is approximately", Q3, "\n")

**output:**

First quartile (Q1) is approximately 20

Third quartile (Q3) is approximately 35

**6. Suppose a hospital tested the age and body fat data for 18 randomly selected adults with the**

**following result**

**age 23 23 27 27 39 41 47 49 50**

**%fat 9.5 26.5 7.8 17.8 31.4 25.9 27.4 27.2 31.2**

**age 52 54 54 56 57 58 58 60 61**

**%fat 34.6 42.5 28.8 33.4 30.2 34.1 32.9 41.2 35.7**

**a. Calculate the standard deviation of age and %fat**.

age <- c(23, 23, 27, 27, 39, 41, 47, 49, 50, 52, 54, 54, 56, 57, 58, 58, 60, 61)

fat\_perc <- c(9.5, 26.5, 7.8, 17.8, 31.4, 25.9, 27.4, 27.2, 31.2, 34.6, 42.5, 28.8, 33.4, 30.2, 34.1, 32.9, 41.2, 35.7)

age\_sd <- sd(age)

fat\_perc\_sd <- sd(fat\_perc)

age\_var <- var(age)

fat\_perc\_var <- var(fat\_perc)

**source code:**

cat("Standard deviation of age is", age\_sd, "\n")

cat("Standard deviation of %fat is", fat\_perc\_sd, "\n")

cat("Variance of age is", age\_var, "\n")

cat("Variance of %fat is", fat\_perc\_var, "\n")

output :

Standard deviation of age is 13.01894

Standard deviation of %fat is 10.73649

**b. Calculate the Variance of age and %fat for the above dataset.**

**source code:**

cat("Variance of age is", age\_var, "\n")

cat("Variance of %fat is", fat\_perc\_var, "\n")

**output:**

Variance of age is 169.7353

Variance of %fat is 115.6055

**7. Find the H.M of the values 20.0, 35.5, 40.0 and 37.0 with their respective weights 7.0, 8.5, 3.0 and 6.0**

**source code:**

values <- c(20.0, 35.5, 40.0, 37.0)

weights <- c(7.0, 8.5, 3.0, 6.0)

hm <- sum(weights) / sum(weights / values)

print(hm)

**output:**

[1] 29.63953

**8. The demand for a product on each of 20 days was as follows, (in units). 3, 12, 7, 17, 3, 14,** **, 9, 6, 11, 10, 1, 4, 19, 7, 15, 6, 9, 12, 12, 8)**

**source code:**

demand <- c(3, 12, 7, 17, 3, 14, 9, 6, 11, 10, 1, 4, 19, 7, 15, 6, 9, 12, 12, 8)

mean\_demand <- mean(demand)

cat("Arithmetic mean of demand is:", mean\_demand)

**output :**

mean is: 9.2