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The data in Table 5.1 samples of size 50 from a normal distribution, a skewed-right distribution, a skewed-left distribution, and a uniform distribution.

The normal data are female height measurements, the skewed-right data are age at marriage for females, the skewed-left data are obituary data that give the age at death for females, and the uniform data are the amount of cola put into a 12 ounce container by a soft drinks machine.

Problem 1

Find the following:

library (moments)

normal <- c(67, 70, 63, 65, 68, 60, 70, 64, 69, 61, 66, 65, 71, 62, 66, 68, 64, 67, 62, 66, 65, 63, 66, 65, 63, 6 9, 62, 67, 59, 66, 65, 63, 65, 60, 67, 64, 68, 61, 69, 65, 62, 67, 70, 64, 63, 68, 64, 65, 61, 66)

skewed_right <- c(31, 43, 30, 30, 38, 26, 29, 55, 46, 26, 29, 57, 34, 34, 36, 40, 28, 26, 66, 63, 30, 33, 24, 35, 34, 28, 22, 25, 31, 26, 28, 23, 19, 34, 26, 35, 41, 40, 29, 85, 34, 38, 75, 33, 35, 27, 24, 29, 24, 40)

skewed_left <- c(102, 55, 70, 95, 73, 79, 60, 73, 89, 85, 72, 92, 76, 93, 76, 97, 10, 70, 85, 25, 83, 58, 10, 92,

82, 77, 81, 77, 65, 44, 93, 72, 82, 58, 63, 71, 90, 71, 35, 79, 98, 73, 84, 90, 93, 66, 80, 75, 104, 87) uniform <- c(12.1, 12.1, 12.4, 12.1, 12.1, 12.2, 12.2, 12.2, 11.9, 12.2, 12.3, 12.3, 11.7, 12.3, 12.3, 12.4, 12.

4, 12.1, 12.4, 12.4, 12.5, 11.8, 12.5, 12.5, 12.5, 12, 12, 12, 11.9, 12, 11.9, 12.2, 11.9, 11.9, 11.9, 11.8, 11. 8, 11.8, 12.5, 11.8, 11.7, 11.7, 12.3, 11.7, 11.6, 11.6, 12, 11.6, 11.6) a. first

Normal Distribution First Moments:

Skewed-right Distribution First Moments:

[1] 65.12

Skewed-left Distribution First Moments:

[1] 35.48

[1] 74.2

Uniform Distribution First Moments:

[1] 12.056

b. second

Normal Distribution Second Moments:

[1] 4248.92

Skewed-right Distribution Second Moments:

[1] 1437.72

[1] 5925.4

Uniform Distribution Second Moments:

Skewed-left Distribution Second Moments:

[1] 145.426

c. third

[1] 277770.9

Normal Distribution Third Moments:

[1] 68292.44

Skewed-left Distribution Third Moments:

Skewed-right Distribution Third Moments:

[1] 489458.8

[1] 1755.158

Normal Distribution Fourth Moments:

Uniform Distribution Third Moments:

[1] 18194174

[1] 3797594

d. fourth moments for each of the sets of data (normal, skewed-right, skewed-left, uniform)

Skewed-right Distribution Fourth Moments:

Skewed-left Distribution Fourth Moments:

Uniform Distribution Fourth Moments:

[1] 41396161

[1] 21194.59

Problem 2

Find the following:

a. first

Normal Distribution First Moments about the mean:

[1] 0

Skewed-right Distribution First Moments about the mean:

[1] 3.126388e-15

[1] -2.842171e-15

Skewed-left Distribution First Moments about the mean:

Uniform Distribution First Moments about the mean: ## [1] 8.526513e-16

b. second

Normal Distribution Second Moments about the mean:

[1] 8.3056

[1] 178.8896

Skewed-left Distribution Second Moments about the mean: ## [1] 419.76

Uniform Distribution Second Moments about the mean:

Normal Distribution Third Moments about the mean:

Skewed-right Distribution Second Moments about the mean:

c. third

[1] -0.471744

[1] 0.078864

Skewed-right Distribution Third Moments about the mean: ## [1] 4588.128

[1] -12498.26

Uniform Distribution Third Moments about the mean:

Skewed-left Distribution Third Moments about the mean:

d. fourth moments about the mean for each of the sets of data (normal, skewed-right, skewed-left, uniform)

[1] 160.9486

[1] 210642.9

[1] 927289.7

[1] 0.01125117

Find the following:

[1] 0.000335232

Skewed-right Distribution Fourth Moments about the mean:

Skewed-left Distribution Fourth Moments about the mean:

Normal Distribution Fourth Moments about the mean:

Uniform Distribution Fourth Moments about the mean:

Problem 3

Normal Distribution First Moments about the number 75:

Normal Distribution Second Moments about the number 75:

[1] -9.88 b. second

[1] 105.92

c. third

Normal Distribution Third Moments about the number 75:

[1] -1211.08

d. fourth moments about the number 75 for the set of female height measurements ## Normal Distribution Fourth Moments about the number 75:

Problem 4

[1] 14572.64

m_prime1 = firstN2 m_prime2 = secondN2 $m_prime3 = thirdN2$

m_prime4 = fourthN2

a. $m_2 = m_2' - m_1'^2$ $m2 \leftarrow m_prime2 - ((m_prime1)^2)$

Using the results of items 2 and 3 for the set of female height measurements, verify the relations between the moments

[1] "m2 = 8.3055999999998"

paste("m2 = ", m2)

b. $m_3=m_3^\prime-3m_1^\prime m_2^\prime+2m_1^{\prime 3}$ m3 <- m_prime3 - (3*m_prime1*m_prime2) + (2*((m_prime1)^3))

paste("m3 = ",m3)

[1] "m3 = -0.471744000000172"

c. $m_4 = m_4^\prime - 4 m_1^\prime m_3^\prime + 6 m_1^{\prime 2} m_2^\prime - 3 m_1^{\prime 4}$ $m4 \leftarrow m_prime4 - (4*m_prime1*m_prime3) + (6*((m_prime1)^2)*m_prime2) - (3*((m_prime1)^4))$

paste("m4 = ", m4) ## [1] "m4 = 160.948625919991"