

FORMATIVE ASSESSMENT 4

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Table 5.1

Normal	Skewed_Right	Skewed_Left	Uniform
67	31	102	12.1
70	43	55	12.1
63	30	70	12.4
65	30	95	12.1
68	38	73	12.1
60	26	79	12.2
70	29	60	12.2
64	55	73	12.2
69	46	89	11.9
61	26	85	12.2
66	29	72	12.3
65	57	92	12.3
71	34	76	11.7
62	34	93	12.3
66	36	76	12.3
68	40	97	12.4
64	28	10	12.4
67	26	70	12.1
62	66	85	12.4
66	63	25	12.4
65	30	83	12.5
63	33	58	11.8
66	24	10	12.5
65	35	92	12.5
63	34	82	12.5
69	40	87	11.6
62	24	104	11.6
67	29	75	12.0
59	24	80	11.6
66	27	66	11.6
65	35	93	11.7
63	33	90	12.3
65	75	84	11.7
60	38	73	11.7
67	34	98	11.7
64	85	79	11.8
68	29	35	12.5
61	40	71	11.8
69	41	90	11.8
65	35	71	11.8
62	26	63	11.9
67	34	58	11.9
70	19	82	11.9
64	23	72	12.2
63	28	93	11.9
68	26	44	12.0
64	31	65	11.9
65	25	77	12.0
61	22	81	12.0
66	28	77	12.0

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.

Compute the following:

1. Find the (a) first, (b) second, (c) third, and (d) fourth moments for each of the sets of data (normal, skewed-right, skewed-left, uniform).

Normal

- a. First Moment: 65.12
- b. Second Moment: 4248.92
- c. Third Moment: 277770.92
- d. Fourth Moment:18194173.64

Skewed-right

- a. First Moment: 35.48
- b. Second Moment: 1437.72
- c. Third Moment: 68292.44
- d. Fourth Moment:3797594.04

Skewed-left

- a. First Moment: 74.2
- b. Second Moment: 5925.4
- c. Third Moment: 489458.8
- d. Fourth Moment:41396161.48

Uniform

- a. First Moment: 12.06
- b. Second Moment: 145.43
- c. Third Moment: 1755.16
- d. Fourth Moment:21194.59

2. Find the (a) first, (b) second, (c) third, and (d) fourth moments about the mean for each of the sets of data (normal, skewed-right, skewed-left, uniform).

Normal

- a. First Moment: 0
- b. Second Moment: 8.31
- c. Third Moment: -0.47
- d. Fourth Moment:160.95

Skewed-right

- a. First Moment: 0
- b. Second Moment: 178.89
- c. Third Moment: 4588.13
- d. Fourth Moment:210642.88

Skewed-Left

- a. First Moment: 0
- b. Second Moment: 419.76
- c. Third Moment: -12498.26
- d. Fourth Moment:927289.75

Uniform

- a. First Moment: 0
- b. Second Moment: 0.08
- c. Third Moment: 0
- d. Fourth Moment:0.01

3. Find the (a) first, (b) second, (c) third, and (d) fourth moments about the number 75 for the set of female height measurements.

Female height measurements

- a. First Moment: -9.88
- b. Second Moment: 105.92
- c. Third Moment: -1211.08
- d. Fourth Moment:14572.64

4. Using the results of items 2 and 3 for the set of female height measurements, verify the relations between the moments (a) $m_2 = m'_2 - m_1'^2$, (b)

$m_3 = m'_3 - 3m'_1m'_2 + 2m_1'^3$, (c) $m_4 = m'_4 - 4m'_1m'_3 + 6m_1'^2m'_2 - 3m_1'^4$.

- a. $m_2 = m'_2 - m_1'^2$
8.31 = 8.31
Verification: The result is the same. Thus it is correct.
- b. $m_3 = m'_3 - 3m'_1m'_2 + 2m_1'^3$
-0.47 = -0.47
Verification: The result is the same. Thus it is correct.
- c. $m_4 = m'_4 - 4m'_1m'_3 + 6m_1'^2m'_2 - 3m_1'^4$
160.95 = 160.95
Verification: The result is the same. Thus it is correct.