

## Answer on Question #82969 – Math – Statistics and Probability

### Question

The milk yield, in litres, of 10 cows in a herd in a week is as given below:

18,21,20,17,24,22,16,25,15,20

Compute the first three moments about the mean and the skewness for the data given above.

### Solution

$$\text{Mean } \mu = \frac{1}{n} \sum x_i = \frac{18+21+20+17+24+22+16+25+15+20}{10} = \frac{198}{10} = 19.8.$$

$$\text{1-st moment about mean: } \frac{1}{n} \sum (x_i - \mu) = \mu - \mu = 0.$$

$$\begin{aligned} \text{2-nd moment about mean (variance): } \sigma^2 &= \frac{1}{n} \sum (x_i - \mu)^2 = \\ &= \frac{3.24+1.44+0.04+7.84+17.64+4.84+14.44+27.04+23.04+0.04}{10} = \frac{99.6}{10} = 9.96. \end{aligned}$$

$$\begin{aligned} \text{3-rd moment about mean: } M_3 &= \frac{1}{n} \sum (x_i - \mu)^3 = \\ &= \frac{-5.832+1.728+0.008-21.952+74.088+10.648-54.872+140.608-110.592+0.008}{10} = \frac{33.84}{10} = \\ &= 3.384. \end{aligned}$$

$$\text{Skewness: } SK = \frac{M_3}{\sigma} = \frac{3.384}{\sqrt{9.96}} = 1.0723.$$