

Homework Solutions

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Exercise 30

- (a) The population mean is 4.
 (b) First, find SSX.

$$\begin{aligned}
 \text{SSX} &= \sum (x - \mu)^2 \\
 &= (2 - 4)^2 + (4 - 4)^2 + (6 - 4)^2 \\
 &= 4 + 0 + 4 \\
 &= 8.
 \end{aligned}$$

Then the variance is $\sigma^2 = \frac{\text{SSX}}{N} = \frac{8}{3} = 2.6667$.

- (c)

Observed sample of size $n = 2$	Sample Mean	Sample Variance (using n in denominator)	Sample Variance (using $n - 1$ in denominator)
2, 2	2	0	0
2, 4	3	1	2
2, 6	4	4	8
4, 2	3	1	2
4, 4	4	0	0
4, 6	5	1	2
6, 2	4	4	8
6, 4	5	1	2
6, 6	6	0	0

- (d) The average is $\frac{0+1+4+1+0+1+4+1+0}{9} = \frac{12}{9} = 1.3333$. It is only half as large as σ^2 .
 (e) The average is $\frac{0+2+8+2+0+2+8+2+0}{9} = \frac{24}{9} = 2.6667$. It is equal to σ^2 .
 (f) The formula with $n - 1$ gives an unbiased estimator of σ^2 .