

Parameters, Statistics, and Inference

Distinguish population parameters from sample observations and statistics. A statistic may depend only on observed sample values and known constants.

1. For the sample 9, 12, 15, 18, 8, compute $\bar{x}$, the sample variance s^2 using denominator $n-1$, and sample SD s .

Reference: Use $\bar{x} = (\sum x_i)/n$ and $s^2 = \sum (x_i - \bar{x})^2 / (n-1)$. Round only final nonintegers to three decimals.

2. A team graphs the sampled reaction times and reports their sample mean. Which stage is this?

Reference: Collection obtains observations; description summarizes the observed sample; inference uses a sample to learn about a population.

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Distinguish population parameters from sample observations and statistics. A statistic may depend only on observed sample values and known constants.

3. For study 3 of sampled commute times, a student proposes $\sum(x_i - \mu)^2/n$ as a statistic, where μ is the unknown population mean. Is it a statistic? Give a valid replacement.

Reference: A statistic cannot contain an unknown population parameter; it must be computable from observed data and known constants.

4. A population consists of all seedling heights. A random sample records 12, 15, 18, 8, 11. Identify one observation, the population mean parameter μ , and the sample-mean statistic.

Reference: A parameter describes the population and is typically unknown. An observation is one recorded value. A statistic is computed only from sample observations and known constants.

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Distinguish population parameters from sample observations and statistics. A statistic may depend only on observed sample values and known constants.

5. For study 5 of sampled battery lifetimes, a student proposes $\sum(x_i - \mu)^2/n$ as a statistic, where μ is the unknown population mean. Is it a statistic? Give a valid replacement.

Reference: A statistic cannot contain an unknown population parameter; it must be computable from observed data and known constants.

6. A population consists of all weekly sales. A random sample records 14, 17, 20, 10, 13, 16, 19. Identify one observation, the population mean parameter μ , and the sample-mean statistic.

Reference: A parameter describes the population and is typically unknown. An observation is one recorded value. A statistic is computed only from sample observations and known constants.

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Distinguish population parameters from sample observations and statistics. A statistic may depend only on observed sample values and known constants.

7. A team randomly selects 40 records and measures reaction times. Which stage is this?

Reference: Collection obtains observations; description summarizes the observed sample; inference uses a sample to learn about a population.

8. For the sample 16, 19, 9, 12, 15, 18, compute $\bar{x}$, the sample variance s^2 using denominator $n-1$, and sample SD s .

Reference: Use $\bar{x} = (\sum x_i)/n$ and $s^2 = \sum (x_i - \bar{x})^2 / (n-1)$. Round only final nonintegers to three decimals.

Parameters, Statistics, and Inference
Worked Answer Key

Distinguish population parameters from sample observations and statistics. A statistic may depend only on observed sample values and known constants.

1. For the sample 9, 12, 15, 18, 8, compute $\bar{x}$, the sample variance s^2 using denominator $n-1$, and sample SD s .

Reference: Use $\bar{x} = (\sum x_i)/n$ and $s^2 = \sum (x_i - \bar{x})^2 / (n-1)$. Round only final nonintegers to three decimals.

Answer: $\bar{x}$ -bar 12.4; s^2 17.3; s 4.159

1. $\bar{x} = (9+12+15+18+8)/5 = 12.4$.
2. $s^2 = \sum (x_i - \bar{x})^2 / 4 = 17.3$.
3. $s = \sqrt{s^2} = 4.159$.

2. A team graphs the sampled reaction times and reports their sample mean. Which stage is this?

Reference: Collection obtains observations; description summarizes the observed sample; inference uses a sample to learn about a population.

Answer: description

1. The action summarizes only observed data, so it is description.

Math Sheet

Name _____ Score _____ Teacher _____ Date _____

Parameters, Statistics, and Inference

Worked Answer Key

Distinguish population parameters from sample observations and statistics. A statistic may depend only on observed sample values and known constants.

3. For study 3 of sampled commute times, a student proposes $\sum(x_i - \mu)^2/n$ as a statistic, where μ is the unknown population mean. Is it a statistic? Give a valid replacement.

Reference: A statistic cannot contain an unknown population parameter; it must be computable from observed data and known constants.

Answer: No; use $\sum(x_i - \bar{x})^2/(n-1)$

1. $\sum(x_i - \mu)^2/n$ contains unknown μ , so the sample alone cannot determine it.
2. $\sum(x_i - \bar{x})^2/(n-1)$ uses only observations and their sample mean, so it is a statistic.

4. A population consists of all seedling heights. A random sample records 12, 15, 18, 8, 11. Identify one observation, the population mean parameter μ , and the sample-mean statistic.

Reference: A parameter describes the population and is typically unknown. An observation is one recorded value. A statistic is computed only from sample observations and known constants.

Answer: observation 12; parameter μ =population mean; statistic $\bar{x}$ =12.8

1. 12 is one observed data value.
2. μ denotes the unknown mean of all population seedling heights.
3. $\bar{x} = (12+15+18+8+11)/5 = 12.8$.

Parameters, Statistics, and Inference

Worked Answer Key

Distinguish population parameters from sample observations and statistics. A statistic may depend only on observed sample values and known constants.

5. For study 5 of sampled battery lifetimes, a student proposes $\sum(x_i - \mu)^2/n$ as a statistic, where μ is the unknown population mean. Is it a statistic? Give a valid replacement.

Reference: A statistic cannot contain an unknown population parameter; it must be computable from observed data and known constants.

Answer: No; use $\sum(x_i - \bar{x})^2/(n-1)$

1. $\sum(x_i - \mu)^2/n$ contains unknown μ , so the sample alone cannot determine it.

2. $\sum(x_i - \bar{x})^2/(n-1)$ uses only observations and their sample mean, so it is a statistic.

6. A population consists of all weekly sales. A random sample records 14, 17, 20, 10, 13, 16, 19. Identify one observation, the population mean parameter μ , and the sample-mean statistic.

Reference: A parameter describes the population and is typically unknown. An observation is one recorded value. A statistic is computed only from sample observations and known constants.

Answer: observation 14; parameter μ =population mean; statistic $\bar{x}$ =15.571

1. 14 is one observed data value.

2. μ denotes the unknown mean of all population weekly sales.

3. $\bar{x} = (14+17+20+10+13+16+19)/7 = 15.571$.

Parameters, Statistics, and Inference

Worked Answer Key

Distinguish population parameters from sample observations and statistics. A statistic may depend only on observed sample values and known constants.

7. A team randomly selects 40 records and measures reaction times. Which stage is this?

Reference: Collection obtains observations; description summarizes the observed sample; inference uses a sample to learn about a population.

Answer: collection

1. The action selects and measures units, so it is collection.

8. For the sample 16, 19, 9, 12, 15, 18, compute $\bar{x}$, the sample variance s^2 using denominator $n-1$, and sample SD s .

Reference: Use $\bar{x} = (\sum x_i)/n$ and $s^2 = \sum (x_i - \bar{x})^2 / (n-1)$. Round only final nonintegers to three decimals.

Answer: $\bar{x}$ 14.833; s^2 14.167; s 3.764

1. $\bar{x} = (16+19+9+12+15+18)/6 = 14.833$.

2. $s^2 = \sum (x_i - \bar{x})^2 / 5 = 14.167$.

3. $s = \sqrt{s^2} = 3.764$.