

Solve the problem.

- 1) Consider the population described by the probability distribution below.

x	3	5	7
$p(x)$.1	.7	.2

- a. Find μ .
- b. Find the sampling distribution of the sample mean \bar{x} for a random sample of $n = 2$ measurements from the distribution.
- c. Show that \bar{x} is an unbiased estimator of μ .

- 2) Consider the population described by the probability distribution below.

x	3	5	7
$p(x)$.1	.7	.2

- a. Find σ^2 .
- b. Find the sampling distribution of the sample variance s^2 for a random sample of $n = 2$ measurements from the distribution.
- c. Show that s^2 is an unbiased estimator of σ^2 .

- 3) The amount of time it takes a student to walk from her home to class has a skewed right distribution with a mean of 10 minutes and a standard deviation of 1.6 minutes. If times were collected from 40 randomly selected walks, describe the sampling distribution of \bar{x} , the sample mean time.

- 4) One year, the distribution of salaries for professional sports players had mean \$1.6 million and standard deviation \$0.7 million. Suppose a sample of 100 major league players was taken. Find the approximate probability that the average salary of the 100 players that year exceeded \$1.1 million.

- 5) Suppose a random sample of n measurements is selected from a binomial population with probability of success $p = .32$. Given $n = 400$, describe the shape, and find the mean and the standard deviation of the sampling distribution of the sample proportion, \hat{p} .

- 6) Suppose a random sample of $n = 64$ measurements is selected from a population with mean $\mu = 65$ and standard deviation $\sigma = 12$. Find the probability that \bar{x} falls between 65.75 and 68.75.

- 7) The average score of all golfers for a particular course has a mean of 66 and a standard deviation of 3.5. Suppose 49 golfers played the course today. Find the probability that the average score of the 49 golfers exceeded 67.

- 8) A random sample of $n = 300$ measurements is drawn from a binomial population with probability of success .43. Give the mean and the standard deviation of the sampling distribution of the sample proportion, \hat{p} .

- 9) Suppose a random sample of n measurements is selected from a binomial population with probability of success $p = .32$. Given $n = 400$, describe the shape, and find the mean and the standard deviation of the sampling distribution of the sample proportion, \hat{p} .

At a large university, students have an average credit card debt of \$2500, with a standard deviation of \$1200. A random sample of students is selected and interviewed about their credit card debt. Use the 68-95-99.7 Rule to answer the question about the mean credit card debt for the students in this sample.

- 10) If we imagine all the possible random samples of 100 students at this university, 68% of the samples should have means between what two numbers?

Answer Key

Testname: STT315 PRACTICE CH 5

1) a. $\mu = E(x) = .1(3) + .7(5) + .2(7) = 5.2$

b.

\bar{x}	3	4	5	6	7
$p(\bar{x})$.01	.14	.53	.28	.04

c. $E(\bar{x}) = .01(3) + .14(4) + .53(5) + .28(6) + .04(7) = 5.2$; Since $E(\bar{x}) = \mu$, \bar{x} is an unbiased estimator of μ .

2) a. $\sigma^2 = .1(3 - 5.2)^2 + .7(5 - 5.2)^2 + .2(7 - 5.2)^2 = 1.16$

b.

s^2	0	2	8
$p(s^2)$.54	.42	.04

c. $E(s^2) = .54(0) + .42(2) + .04(8) = 1.16$; Since $E(s^2) = \sigma^2$, s^2 is an unbiased estimator of σ^2 .

3) By the Central Limit Theorem, the sampling distribution of \bar{x} is approximately normal with $\mu_{\bar{x}} = \mu = 10$ minutes and

$$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{1.6}{\sqrt{40}} = 0.2530 \text{ minutes.}$$

4) approximately 1

5) approximately normal; 0.32, 0.023

6) $P(65.75 \leq \bar{x} \leq 68.75) = P(.5 \leq z \leq 2.5) \approx .3023$

7) .0228

8) .43; .029

9) approximately normal; 0.32, 0.023

10) \$2380.00 and \$2620.00