1. The probability distribution shown here describes a population of measurements that can assume values of 4, 5, 6, and 7, each of which occurs with the same relative frequency.

x	4	5	6	7
p(x)	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$

a. Calculate the mean of all the different samples of n = 2 measurements that can be selected from this population. Select the correct choice below and fill in the answer boxes within your choice.

○A.

Sample	4,5	4,6	4,7	5,4	5,6	5,7	6,4	6,5	6,7	7,4	7,5	7,6
$\bar{x}$	■	■	■	■	■	■	■	■	■	■	■	■

○B.

Sample	4,4	4,5	4,6	4,7	5,5	5,6	5,7	6,6	6,7	7,7
$\bar{x}$	■	■	■	■	■	■	■	■	■	■

○C.

Sample	4,4	4,5	4,6	4,7	5,4	5,5	5,6	5,7
$\bar{x}$	■	■	■	■	■	■	■	■

Sample	6,4	6,5	6,6	6,7	7,4	7,5	7,6	7,7
$\bar{x}$	■	■	■	■	■	■	■	■

b. If a sample of n = 2 measurements is randomly selected from the population, what is the probability that a specific sample will be selected?

□

(Type an exact answer in simplified form.)

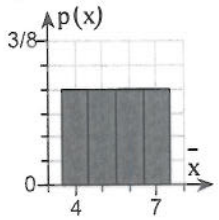
c. Complete the sampling distribution table. Type the $\bar{x}$ values in ascending order.

$\bar{x}$	4	□	5	5.5	□	□	7
Probability	□	$\frac{1}{8}$	□	□	$\frac{3}{16}$	$\frac{1}{8}$	□

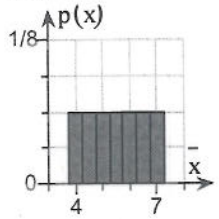
(Type exact answers in simplified form.)

d. Construct a probability histogram for the sampling distribution of $\bar{x}$.

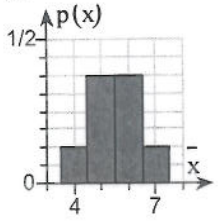
○A.



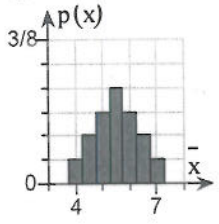
○B.



○C.



○D.



2. Suppose a random sample of n = 64 measurements is selected from a population with mean μ and standard deviation σ. For each of the following values of μ and σ, give the values of $\mu_{\bar{x}}$ and $\sigma_{\bar{x}}$.

a. $\mu = 14, \sigma = 2$ **b.** $\mu = 196, \sigma = 64$ **c.** $\mu = 28, \sigma = 24$ **d.** $\mu = 14, \sigma = 144$

a. $\mu_{\bar{x}} =$ ☐ $\sigma_{\bar{x}} =$ ☐ (Type an integer or a decimal.)

b. $\mu_{\bar{x}} =$ ☐ $\sigma_{\bar{x}} =$ ☐ (Type an integer or a decimal.)

c. $\mu_{\bar{x}} =$ ☐ $\sigma_{\bar{x}} =$ ☐ (Type an integer or a decimal.)

d. $\mu_{\bar{x}} =$ ☐ $\sigma_{\bar{x}} =$ ☐ (Type an integer or a decimal.)

on

3. A random sample of $n = 100$ observations is selected from a population with $\mu = 30$ and $\sigma = 19$. Approximate the probabilities shown below.

a. $P(\bar{x} \geq 28)$ **b.** $P(22.1 \leq \bar{x} \leq 26.8)$

c. $P(\bar{x} \leq 28.2)$ **d.** $P(\bar{x} \geq 27.0)$

Click the icon to view the table of normal curve areas.

a. $P(\bar{x} \geq 28) =$ ☐ (Round to three decimal places as needed.)

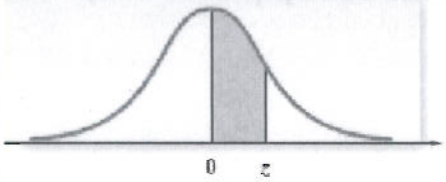
b. $P(22.1 \leq \bar{x} \leq 26.8) =$ ☐ (Round to three decimal places as needed.)

c. $P(\bar{x} \leq 28.2) =$ ☐ (Round to three decimal places as needed.)

d. $P(\bar{x} \geq 27.0) =$ ☐ (Round to three decimal places as needed.)

Normal Curve Areas

3.
(cont.)



z	.00	.01	.02	.03	.04	.05	.06	.07	
.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.(
.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.(
.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1
.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1
.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1
.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2
.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2
.7	.2580	.2611	.2642	.2673	.2704	.2734	.2764	.2794	.2
.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3
.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4
3.0	.4987	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4
z	.00	.01	.02	.03	.04	.05	.06	.07	

4. The average salary for a certain profession is $69,500. Assume that the standard deviation of such salaries is $27,000. Consider a random sample of 54 people in this profession and let $\bar{x}$ represent the mean salary for the sample.

Click the icon to view the table of normal curve areas.

a. What is $\mu_{\bar{x}}$?

$\mu_{\bar{x}} =$ ☐

b. What is $\sigma_{\bar{x}}$?

$\sigma_{\bar{x}} =$ ☐ (Round to two decimal places as needed.)

c. Describe the shape of the sampling distribution of $\bar{x}$.

A. The shape is that of a normal distribution.

B. The shape is that of a uniform distribution.

C. The shape is that of a poisson distribution.

D. The shape is that of a binomial distribution.

d. Find the z-score for the value $\bar{x} = 61{,}500$.

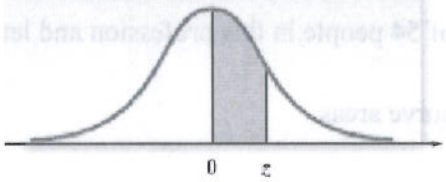
$z =$ ☐ (Round to two decimal places as needed.)

e. Find $P(\bar{x} > 61{,}500)$.

$P(\bar{x} > 61{,}500) =$ ☐ (Round to three decimal places as needed.)

Normal Curve Areas

4.
(cont.)



z	.00	.01	.02	.03	.04	.05	.06	.07	
.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.(
.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.(
.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1
.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1
.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1
.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2
.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2
.7	.2580	.2611	.2642	.2673	.2704	.2734	.2764	.2794	.2
.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.2
.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3
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1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4
3.0	.4987	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4
z	.00	.01	.02	.03	.04	.05	.06	.07	

5. A random sample of 88 observations produced a mean $\bar{x} = 25.9$ and a standard deviation $s = 2.8$.
a. Find a 95% confidence interval for μ.
b. Find a 90% confidence interval for μ.
c. Find a 99% confidence interval for μ.

a. The 95% confidence interval is (□,□).
(Use integers or decimals for any numbers in the expression. Round to two decimal places as needed.)

b. The 90% confidence interval is (□,□).
(Use integers or decimals for any numbers in the expression. Round to two decimal places as needed.)

c. The 99% confidence interval is (□,□).
(Use integers or decimals for any numbers in the expression. Round to two decimal places as needed.)

6. The mean and standard deviation of a random sample of n measurements are equal to 34.4 and 3.5, respectively.

a. Find a 99% confidence interval for μ if $n = 100$.
b. Find a 99% confidence interval for μ if $n = 400$.
c. Find the widths of the confidence intervals found in parts **a** and **b**. What is the effect on the width of a confidence interval of quadrupling the sample size while holding the confidence coefficient fixed?

a. The 99% confidence interval for μ if $n = 100$ is approximately (□,□).
(Round to three decimal places as needed.)

b. The 99% confidence interval μ if $n = 400$ is approximately (□,□).
(Round to three decimal places as needed.)

c. Choose the correct answer below.

- ○A. Quadrupling the sample size while holding the confidence coefficient fixed increases the width of the confidence interval by a factor of 4.
- ○B. Quadrupling the sample size while holding the confidence coefficient fixed does not affect the width of the confidence interval.
- ○C. Quadrupling the sample size while holding the confidence coefficient fixed decreases the width of the confidence interval by a factor of 2.
- ○D. Quadrupling the sample size while holding the confidence coefficient fixed increases the width of the confidence interval by a factor of 2.
- ○E. Quadrupling the sample size while holding the confidence coefficient fixed decreases the width of the confidence interval by a factor of 4.

7. The random sample shown below was selected from a normal distribution.

7, 4, 9, 3, 6, 7

Complete parts a and b.

a. Construct a 95% confidence interval for the population mean μ.

(□,□) (Round to two decimal places as needed.)

b. Assume that sample mean $\bar{x}$ and sample standard deviation s remain exactly the same as those you just calculated but that are based on a sample of n = 25 observations. Repeat part a. What is the effect of increasing the sample size on the width of the confidence intervals?

The confidence interval is (□,□). (Round to two decimal places as needed.)

What is the effect of the sample size on the width of the confidence interval?

- ○A. As the sample size increases, the width increases.
- ○B. As the sample size increases, the width decreases.
- ○C. As the sample size increases, the width stays the same.

8. For the binomial sample information summarized below, indicate whether the sample size is large enough to use the large sample approximation to construct a confidence interval for p.

$n = 50, \hat{p} = 0.40$

Is the sample size large enough?

- ○A. No, because $n\hat{p} < 15$ and $n\hat{q} \geq 15$.
- ○B. No, because $n\hat{p} < 15$ and $n\hat{q} < 15$.
- ○C. No, because $n\hat{p} \geq 15$ and $n\hat{q} < 15$.
- ○D. Yes, because $n\hat{p} \geq 15$ and $n\hat{q} \geq 15$.

9. A newspaper reported that 25% of people say that some coffee shops are overpriced. The source of this information was a telephone survey of 100 adults.

a. Identify the population of interest in this study.
b. Identify the sample for the study.
c. Identify the parameter of interest in the study.
d. Find and interpret a 90% confidence interval for the parameter of interest.

a. Identify the population of interest. Choose the correct answer below.

- ○ 25% of adults
- ○ adults
- ○ coffee shops
- ○ newspapers
- ○ 100 adults
- ○ a telephone survey

b. Identify the sample. Choose the correct answer below.

- ○ newspapers
- ○ a telephone survey
- ○ coffee shops
- ○ 25% of adults
- ○ 100 adults
- ○ adults

c. Identify the parameter of interest. Choose the correct answer below.

- ○A. σ^2, the population variance of adults who say that some coffee shops are overpriced
- ○B. $\hat{p}$, the sample proportion of adults who say that some coffee shops are overpriced
- ○C. p, the population proportion of adults who say that some coffee shops are overpriced
- ○D. $\bar{x}$, the sample mean number of adults who say that some coffee shops are overpriced

d. The 90% confidence interval for the parameter of interest is (☐,☐).
(Round to two decimal places as needed.)

Interpret this confidence interval. Choose the correct answer below.

- ○A. There is a 90% chance that the value of the parameter of interest is outside the interval.
- ○B. We are 90% confident that the parameter of interest lies in the confidence interval.
- ○C. We are confident that 90% of the population is outside the interval for the parameter of interest.
- ○D. We are confident that 90% of the population is described by the interval for the parameter of interest.

10. Researchers conducted a study of variety in exercise workouts. A sample of 120 men and women were randomly divided into three groups, with 40 people per group. Group 1 members varied their exercise routine in workouts, group 2 members performed the same exercise at each workout, and group 3 members had no set schedule or regulations for their workouts.

a. By the end of the study, 17 people had dropped out of the first exercise group. Estimate the dropout rate for exercisers who vary their routine in workouts. Use a 90% confidence interval.

The 90% confidence interval is (☐,☐).
(Round to the nearest hundredth as needed.)

Interpret the result. Choose the correct answer below.

- ○A. We are 90% confident that the true dropout rate for exercisers who vary their routine in workouts is not in interval found the in previous step.
- ○B. We are 90% confident that the true dropout rate for exercisers who vary their routine in workouts is in interval found in the previous step.
- ○C. We are 10% confident that the true dropout rate for exercisers who vary their routine in workouts is in interval found in the previous step.
- ○D. We are 100% confident that the true dropout rate for exercisers who vary their routine in workouts is in interval found in the previous step.

b. By the end of the study, 22 people had dropped out of the third exercise group. Estimate the dropout rate for exercisers who have no set schedule for their workouts. Use a 90% confidence interval.

The 90% confidence interval is (☐,☐).
(Round to the nearest hundredth as needed.)

Interpret the result. Choose the correct answer below.

- ○A. We are 90% confident that the true dropout rate for exercisers who have no set schedule for their workouts is in interval found in the previous step.
- ○B. We are 90% confident that the true dropout rate for exercisers who have no set schedule for their workouts is not in interval found in the previous step.
- ○C. We are 100% confident that the true dropout rate for exercisers who have no set schedule for their workouts is is in interval found in the previous step.
- ○D. We are 10% confident that the true dropout rate for exercisers who have no set schedule for their workouts is in interval found in the previous step.

11. If you wish to estimate a population mean with a sampling distribution error SE = 0.24 using a 95% confidence interval and you know from prior sampling that σ^2 is approximately equal to 8.1, how many observations would have to be included in your sample?

The number of observations that would have to be included in your sample is ☐.
(Round up to the nearest observation.)

12. Suppose N = 50,000, n = 12,500, and s = 50.
a. Compute the standard error of $\bar{x}$ using the finite population correction factor.
b. Repeat part a assuming n = 25,000.
c. Repeat part a assuming n = 50,000.
d. Compare parts **a**, **b**, and **c**, and describe what happens to the standard error of $\bar{x}$ as n is increased.

a. What is the standard error of $\bar{x}$?

☐
(Round to four decimal places as needed.)

b. What is the standard error of $\bar{x}$ when n = 25,000?

☐
(Round to four decimal places as needed.)

c. What is the standard error of $\bar{x}$ when n = 50,000?

☐
(Round to four decimal places as needed.)

d. What happens to the standard error of $\bar{x}$ as n is increased?

- ○ A. There is no correlation.
- ○ B. It decreases.
- ○ C. It stays the same.
- ○ D. It increases.

13. Suppose you want to estimate a population proportion, p, and $\hat{p}$ = 0.45, N = 6,100, and n = 1,700. Find an approximate 95% confidence interval for p.

An approximate 95% confidence interval for p is ☐ ± ☐.
(Round to three decimal places as needed.)

14. A random sample of size n = 20 was drawn from a population of size N = 200. The measurements shown in the table to the right were obtained.

48	27	50	26
34	20	38	28
49	54	18	54
26	37	34	45
49	39	36	35

a. Estimate μ with an approximate 95% confidence interval.
b. Estimate p, the proportion of measurements in the population that are greater than 30, with an approximate 95% confidence interval.

a. An approximate 95% confidence interval estimate for μ is 37.3 ± 4.687.
(Round to three decimal places as needed.)

b. An approximate 95% confidence interval estimate for p is ☐ ± ☐.
(Round to three decimal places as needed.)

YOU ANSWERED: 4.841

15. In order to evaluate the reasonableness of a firm's stated total value of its parts inventory, an auditor randomly samples 50 of the total of 400 parts in stock, prices each part, and reports the results shown in the table. Use this information to answer the following questions.

Part Price	$89	$30	$18	$66	$10	$59	$98	$69
Sample Size	8	9	10	3	6	3	2	9

a. Give a point estimate of the mean value of the parts inventory.

$☐ (Round to the nearest cent as needed.)

b. Find the estimated standard error of the point estimate of part **a**.

$☐ (Round to the nearest cent as needed.)

c. The auditor estimates the mean value of the parts to be in the interval $☐ to $☐ with 95% confidence.
(Round to the nearest cent as needed. Use the answer from part b to find this answer.)

d. The firm reported a mean parts inventory value of $64. What does the confidence interval of part **c** suggest about the reasonableness of the firm's reported figure?

- ○ A. The confidence interval found suggests nothing about the mean reported by the firm.
- ○ B. The mean reported by the firm is a reasonable value.
- ○ C. The mean reported by the firm is not a reasonable value.