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Chapter 17

Audit Sampling for Tests of Details of Balances

■ Concept Checks

P. 575

1. The steps in nonstatistical sampling for tests of details of balances and for tests of controls are almost identical, as illustrated in the text. The major differences are that sampling for tests of controls deals with exceptions and sampling for tests of details of balances concerns dollar amounts. This results in differences in the application of the two methods, but not the steps. Because of these differences in objectives, tests of controls and substantives tests of transactions are designed to measure the *occurrence rate* of an attribute. In contrast, tests of details of balances are designed to measure the *amount of monetary misstatements* in the population being sampled.

2. When a population is not considered acceptable, there are several possible courses of action:

   - *Perform expanded audit tests in specific areas.* If an analysis of the misstatements indicates that most of the misstatements are of a specific type, it may be desirable to restrict the additional audit effort to the problem area.
   - *Increase the sample size.* When the auditor increases the sample size, sampling risk is reduced if the rate of misstatements in the expanded sample, their dollar amount, and their direction are similar to those in the original sample. Increasing the sample size, therefore, may allow the auditor to conclude that the population is acceptable. However, increasing the sample size is often costly, especially when the difference between tolerable misstatement and projected misstatement is small.
   - *Adjust the account balance.* When the auditor concludes that an account balance is materially misstated, the client may be willing to adjust the book value.
   - *Request the client to correct the population.* In some cases the client's records are so inadequate that a correction of the entire population is required before the audit can be completed.
   - *Refuse to give an unmodified opinion.* If the auditor believes the recorded amount in accounts receivable or any other account is not fairly stated, it is necessary to follow at least one of the above alternatives or to qualify the audit opinion in an appropriate manner.

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1. The sampling interval is the book value of the population being sampled divided by the sample size. An individual dollar that is selected for sampling represents the entire sampling interval.

2. The projected misstatement for the item sampled is the percentage error multiplied by the sampling interval:

($300/$3000) = .10 x $15,000 = $1,500

P. 588

1. Difference estimation is a method for estimating the total misstatement in a population by multiplying the average misstatement (the audited value minus the recorded value) in a random sample by the number of items in the entire population.

Ratio estimation is quite similar to difference estimation. However, instead of basing the estimate of total misstatement on the difference between audited and recorded values, it uses the ratio of misstatement amounts to recorded amounts. This ratio for the sample is multiplied times the total population recorded amount to estimate total misstatement. Mean-per-unit estimation is a method of estimating the total audited value of the population by multiplying the arithmetic average, or mean audited value of the sample times the number of items in the population.

Stratified mean-per-unit estimation is similar to mean-per-unit estimation except that the population is divided into groups of homogeneous items, called strata, for purposes of sample design. A separate random sample is selected from each stratum and the estimate of the total population audited amount is computed by determining an estimate for each stratum and adding the results.

The following are examples where each method could be used:

a. Difference estimation can be used in computing the balance in accounts receivable by using the misstatements discovered during the confirmation process, where a significant number of misstatements are found.
b. Ratio estimation can be used to determine the amount of the LIFO reserve where internal inventory records are maintained on a FIFO basis but reporting is on LIFO.
c. Mean-per-unit estimation can be used to determine total inventory value where the periodic inventory method is employed.
d. Stratified mean-per-unit estimation can be used to determine total inventory value where there are several locations and each is sampled separately.

Concept Check, P. 588 (continued)

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2. Tolerable misstatement represents performance materiality for an individual sampling application. It is the amount of misstatement the auditor believes can be present in an account and the account balance still be acceptable for audit purposes.

   Since hypothesis testing requires a decision rule based on materiality, that amount should be tolerable misstatement. If test results provide a confidence limit greater than tolerable misstatement, the auditor would conclude the account is misstated. This would result in one or more of several actions:

   - Perform expanded audit tests in specific areas.
   - Increase the sample size.
   - Adjust the account balance.
   - Request the client to correct the population.
   - Refuse to give an unmodified opinion.

   In addition, it may be possible to adjust tolerable misstatement (upward) and remake the decision. The basis for this would be a reconsideration of the original judgment concerning determining overall materiality and performance materiality for the accounts.

■ Review Questions

17-1 The most important difference between (a) tests of controls and substantive tests of transactions and (b) tests of details of balances is in what the auditor wants to measure. In tests of controls and substantive tests of transactions, the primary concern is testing the effectiveness of internal controls and the rate of monetary misstatements. When statistical sampling is used for tests of controls and substantive tests of transactions, attributes sampling is ideal because it measures the frequency of occurrence (exception rate). In tests of details of balances, the concern is determining whether the monetary amount of an account balance is materially misstated. Attributes sampling, therefore, is seldom useful for tests of details of balances.

17-2 Stratified sampling is a method of sampling in which all the elements in the total population are divided into two or more subpopulations. Each subpopulation is then independently sampled and tested and the results are projected to the population. After the results of the individual parts have been computed, they are combined into one overall population measurement. Stratified sampling is important when the auditor wants to emphasize testing of certain population items.

In order for an auditor to obtain a stratified sample of 30 items from each of three strata in the confirmation of accounts receivable, he or she must first divide the population into three mutually exclusive strata. A random sample of 30 items is then selected independently for each stratum.

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17-3 ARIA for tests of details of balances is the equivalent of ARO for tests of controls and substantive tests of transactions. There is an inverse relation between ARO for tests of controls and ARIA for tests of details of balances. If internal controls are considered to be effective, control risk can be reduced. A lower control risk requires a lower ARO, which requires a larger sample size for testing. If controls are determined to be effective after testing, control risk can remain low, which permits the auditor to increase ARIA. An increased ARIA allows the auditor to reduce sample sizes for tests of details of balances.

17-4 The point estimate is an estimate of the total amount of misstatement in the population as projected from the known misstatements found in the sample. The projection is based on either the average misstatement in the sample times the population size, or the net percent of misstatement in the sample times the population book value.

The true value of misstatements in the population is the net sum of all misstatements in the population and can only be determined by a 100% audit.

17-5 The statement illustrates how the misuse of statistical estimation can impair the use of an otherwise valuable audit tool. The auditor's mistake is that he or she treats the point estimate as if it is the true population value, instead of but one possible value in a statistical distribution. Rather than judge whether the point estimate is material, the auditor should construct a statistical confidence interval around the point estimate, and consider whether the interval indicates a material misstatement. Among other factors, the interval will reflect appropriate levels of risk and sample size.

17-6 Monetary unit sampling is a method whereby the population is defined as the individual dollars (or other currency) making up the account balance. A random sample is drawn of these individual monetary units and the physical audit units containing them are identified and audited. The results of auditing the physical audit units are applied, pro rata, to the random monetary units, and a statistical conclusion about all population monetary units is derived.

Monetary unit sampling is the most commonly used method of statistical sampling for tests of details of balances. This is because it uses the simplicity of attributes sampling yet still provides a statistical result expressed in dollars. It does this by using attribute tables to estimate the total proportion of population dollars misstated, based on the number of sample dollars misstated.

17-7 Sampling risk is the risk that the characteristics in the sample are not representative of those in the population. The two types of sampling risk faced by the auditor testing an account balance are:

a. The risk of incorrect acceptance (ARIA) — this is the risk that the sample supports the conclusion that the recorded account balance is not materially misstated when it is materially misstated.
b. The risk of incorrect rejection (ARIR) — this is the risk that the sample supports the conclusion that the recorded account balance is materially misstated when it is not materially misstated.

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17-7 (continued)

Sampling risk occurs whenever a sample is taken from a population and therefore applies to all sampling methods. While ARIA applies to all sampling methods, ARIR is only used in variables sampling and difference estimation.

17-8 The preliminary sample size is calculated as follows:

Confidence factor (10% ARIA, no expected misstatements)	2.31
÷ Tolerable misstatement as percentage of population ($500,000 ÷ $12,625,000)	÷ .04
= Sample size	58

17-9 The two methods of selecting a monetary unit sample are random sampling and systematic sampling. Under random sampling, in this situation, 58 random numbers would be obtained (the sample size in 17-8) between 1 and 12,625,000. These would be sorted into ascending sequence. The physical audit units in the inventory listing containing the random monetary units would then be identified by accumulating amounts with a spreadsheet if the data is in machine-readable form. As the cumulative total exceeds a successive random number, the item causing this event is identified as containing the random dollar unit.

When systematic sampling is used, the population total amount is divided by the sample size to obtain the sampling interval. A random number is chosen between 1 and the amount of the sampling interval to determine the starting point. The dollars to be selected are the starting point and then the starting point plus the interval amount applied successively to the population total. The items on the inventory listing containing the dollar units are identified using the cumulative method described previously.

17-10 Acceptable risk of incorrect acceptance (ARIA) is the risk the auditor is willing to take of accepting a balance as correct when the true misstatement in the balance is greater than tolerable misstatement. ARIA is the equivalent term to acceptable risk of overreliance for audit sampling for tests of controls and substantive tests of transactions.

The primary factor affecting the auditor's decision about ARIA is control risk in the audit risk model, which is the extent to which the auditor relies on internal controls. When internal controls are effective, control risk can be reduced, which permits the auditor to increase ARIA, which in turn reduces the required sample size. Besides control risk, ARIA is also affected directly by acceptable audit risk and inversely by inherent risk and other substantive tests already performed on the account balance, assuming effective results. For example, if acceptable audit risk is reduced, ARIA must also be reduced. If analytical procedures were performed and there is no indication of problem areas, there is a lower likelihood of misstatements in the account being tested, and ARIA can be increased.

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17-11 The statement reflects a misunderstanding of the statistical inference process. The process is based on the long-run probability that the process will produce correct results in a predictable proportion of the times it is applied. Thus, a random sampling process that produces a 90% confidence interval will produce intervals that do, in fact, contain the true population value 90% of the time. However, the confidence limits of each interval will not all be the same.

17-12 Basic precision is the upper limit when no misstatements are found in the sample, and represents the minimum allowance for sampling risk inherent in the sample. It is calculated by multiplying the sampling interval by the confidence factor for zero misstatements at the specified level of ARIA.

17-13 Misstatement bounds

MISSTATEMENT	RECORDED VALUE	AUDITED VALUE	MISSTATEMENT	TAINTING MISSTATEMENT/ RECORDED AMOUNT
1	897.16	609.16	288.00	.321
2	47.02	0	47.02	1.000
3	1,621.68	1,522.68	99.00	.061

The calculation of the misstatement bound is given below:

(a) TAINTING	(b) SAMPLING INTERVAL	(c = a x b) PROJECTED MISSTATEMENT	(d) INCREMENTAL CHANGE IN CONFIDENCE FACTOR	(e = c x d) PROJECTED MISSTATEMENT PLUS INCREMENTAL ALLOWANCE FOR SAMPLING RISK
1.00	126,250	126,250	1.58	199,475
.321	126,250	40,526	1.44	58,357
.061	126,250	7,701	1.36	10.473
Totals		174,477		268,305
Add basic precisions		126,250 x 2.31		291,638
Upper misstatement bound				559,943

Based on this calculation method, the population is not acceptable as stated since the upper misstatement bound exceeds the $500,000 tolerable misstatement.

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17-14 The difficulty in determining sample size lies in estimating the number and amount of misstatements that may be found in the sample. The upper bound of a monetary unit sample is sensitive to these factors. Thus, sample size varies a great deal with differing assumptions about the expected amount of misstatements. Sample size also varies with the specified ARIA, which is also an auditor judgment that depends on several factors, such as assessed control risk and inherent risk.

17-15 The population standard deviation is a measure of the difference between the individual values and the mean of the population. It is calculated for all variables sampling methods but not for monetary unit sampling. For the auditor, it is usually estimated before determining the required sample size, based on the previous year's results or on a preliminary sample.

The population standard deviation is needed to calculate the sample size necessary for an acceptable precision interval when variable sampling methods are used. After the sample is selected and audited, the population standard deviation is estimated from the standard deviation calculated from the values in the sample.

The required sample size is directly proportional to the square of the population standard deviation.

17-16 This practice is improper for a number of reasons:

1. No determination was made as to whether a random sample of 100 inventory items would be sufficient to generate an acceptable precision interval for a given confidence level. In fact, a confidence limit was not even calculated.
2. The combined net amount of the sample misstatement may be immaterial because large overstatement amounts may be offsetting large understatement amounts resulting in a relatively small combined net amount.
3. Although no misstatement by itself may be material, other material misstatements might not have exhibited themselves if too small of a sample was taken.
4. Regardless of the size of individual or net amounts of misstatements in a sample, the effect on the overall population cannot be determined unless the results are evaluated using a statistically valid method.

17-17 Difference estimation can be very effective and very efficient where (1) an audited value and a book value is available for each population item, (2) a relatively high frequency of misstatements is expected, and (3) a result in the form of a confidence interval is desired. In those circumstances, difference estimation far outperforms both MUS and mean-per-unit estimation. It may or may not outperform ratio estimation, depending on the relationship of misstatement amounts to recorded amounts. If focus on large dollar value items is required, difference estimation can be used with stratification.

17-18 Examples of audit conclusions resulting from the use of attributes, monetary unit, and variables sampling are as follows:

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Use of attributes sampling in a test of sales transactions for internal verification:

> We have examined a random sample of 100 sales invoices for indication of internal verification; two exceptions were noted. Based on our sample, we conclude, with a 5% risk, that the proportion of sales invoices to which internal verification has not been applied does not exceed 6.2%.

Use of monetary unit sampling in a test of sales transactions for existence:

> We have examined a random sample of 100 dollar units of sales transactions for existence. All were supported by properly prepared sales orders and shipping documents. Based on our sample, we conclude, with a 20% risk, that invalid sales do not exceed $40,000.

Use of variables sampling in confirmation of accounts receivable (in the form of an interval estimate and a hypothesis test):

> We have confirmed a random sample of 100 accounts receivable. We obtained replies or examined satisfactory other evidence for all sample items. A listing of exceptions is attached. Based on our sample, we estimate, with 10% risk, that the true population misstatement is between $20,000 understatement and $40,000 overstatement. Since tolerable misstatement for accounts receivable is judged to be $50,000, we conclude, with a risk of 5%, that accounts receivable are not materially misstated.

■ Multiple Choice Questions from CPA Examinations

17-19 a. (4) b. (2) c. (3)

17-20 a. (3) b. (2) c. (4)

17-21 a. (4) b. (3) c. (4)

■ Multiple Choice Questions From Becker CPA Exam Review

17-22 a. (4) b. (2) c. (1)

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■ Discussion Questions and Problems

17-23 a. 92 (Book value x confidence factor) / tolerable misstatement = (6,900,000 x 2) / 150,000

b. If poor results were obtained for tests of controls and substantive tests of transactions for sales, sales returns and allowances, and cash receipts, the required sample size for tests of details of balances would need to be increased. Using the formula in the problem, the auditor would increase sample size by increasing the confidence factor. This has the same effect as specifying a lower acceptable risk of incorrect acceptance (ARIA).

c. A systematic sample can be selected based on the number of accounts, or the dollar value of the population. To select a systematic sample based on the number of accounts, the total number of accounts in the population is divided by the required sample size to determine the interval. A random number is then selected between one and the interval as the starting point. Because each account has an equal likelihood of selection, this method is appropriate if all the accounts are similar in size, or if the population is stratified into two or more samples.

To select a systematic sample based on the dollar value of the population, the population value is divided by the required sample size to obtain the appropriate interval. A random number is then selected between one and the interval as the starting point. The interval is added to the starting point to determine the dollar units selected. Accounts are selected for testing where the cumulative total of accounts receivable includes the random number. This method of selection is similar to monetary unit selection, and accounts greater than the amount of the interval are automatically selected using this method.

d. The direct projection of error for the sample can be computed as follows:

(Errors in sample/sample book value) x population book value = (1,500/230,000) x 6,900,000 = $45,000 overstatement

The projected error of $45,000 is well below tolerable misstatement of $150,000 and provides an allowance for sampling risk of $105,000. Accordingly, the population is deemed to be fairly stated.

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17-24 (see text Web site for Excel solution for part b.- Filename **P1724.xls**)

a. The following summarizes the confirmation responses:

	Recorded Value	Confirmation Response	Misstatement	
Acct. 147	$ 24,692	$ 22,486	$ 2,206	Pricing error
Acct. 228	183,219	157,216	26,003	Cutoff error
Acct. 278	7,546	5,546	0	Timing difference
Acct. 497	15,319	0	0	Timing difference
Acct. 564	8,397	7,858	539	Error in quantity shipped
Acct. 653	32,687	19,328	13,359	Cutoff error
Acct. 830	5,286	0	5,286	Cutoff error
Total misstatement			$47,393	

b. Estimate of total misstatement (**P1724.xls**):

	Sample Value	Sample Misstatements	Book Value	Projected Misstatement
Stratum 1	$1,287,643	$26,003	$1,287,643	$ 26,003
Stratum 2	1,349,678	15,565	4,348,268	50,146
Stratum 3	94,637	5,825	947,682	58,331
Totals	$2,731,958	$47,3935	$6,583,593	$134,480

c. The population is not acceptable since the projected misstatement of $134,480 exceeds tolerable misstatement of $100,000 even before consideration of sampling risk. The auditor is likely to propose an adjustment for the actual errors detected and increase testing. In this situation, many of the errors involved cutoff, so the auditor could expand testing in this area. Because the cutoff errors were separated from other errors and testing expanded in this area, the cutoff errors would not be included in the projection of error for each stratum.

17-25 Addressing misstatements involves auditor judgment, and depends on the size of the actual misstatements, projected misstatement, and sampling risk. These are approaches an auditor might follow for each situation:

Sample	Response	Comment
1	b. Record an adjustment for actual misstatements	The upper bound will be less than tolerable misstatement after recording an adjustment for $20,000.
2	c. Expand sample size	Expanding the sample will lower sampling risk, which may allow the auditor to accept the sample.
3	d. Request client to fix the population	The large number of errors and large projected misstatement suggests it would be preferable to have the client fix the population.

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17-25 (continued)

Sample	Response	Comment
4	e. Treat the error as an anomaly that is not projected.	The single error related to a currency adjustment. If the auditor performs tests to verify the cause of the error and that it was unique, then the error would not be projected to the population and the population would be acceptable.
5	a. Accept the population	The upper bound, which includes an allowance for sampling risk, is less than tolerable misstatement.
6	c. Expand sample size	Expanding the sample will lower sampling risk, which may allow the auditor to accept the sample.

17-26 (see text Web site for Excel solution for part a. and b.- Filename **P1726.xls**)

a. If random selection is performed using Excel (**P1726.xls**), the command to select numbers randomly from the population is:

=RANDBETWEEN(1,207295)

The 10 random numbers selected using this approach will vary for each student.

The command for selecting the random numbers can be entered directly onto the spreadsheet, or can be selected from the function menu (math & trig) functions. It may be necessary to add the analysis tool pack to access the RANDBETWEEN function. Once the formula is entered, it can be copied down to select additional random numbers.

NOTE: Random dollar items are matched with population item numbers where the cumulative book value of the population includes the random dollar selected.

b.

$$\text{Interval} = \frac{\text{Population total}}{\text{Number of items selected}}$$

$$= \frac{207{,}295}{10}$$

$$= 20{,}729 \text{ Interval}$$

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17-26 (continued)

Using 1857 as a starting point, we have:

	SYSTEMATIC DOLLAR	POPULATION ITEM NO.
1	1,857	2
2	22,586	6
3	43,315	8
4	64,044	8
5	84,773	15
6	105,502	20
7	126,231	26
8	146,960	30
9	167,689	30
10	188,418	35

NOTE: Systematic dollar items are related to population item numbers in the same manner as for part a. above.

c. All items larger than the interval will be automatically included. If the interval is 20,729, item 30 will be included at least once, and item 8 at least twice.

The same is not necessarily true for random number selection, but the probability is high. Note that for item 8, there is a probability of approximately 22% (44,110/207,295) of its being included in a given sample draw. It was included twice in a sample of 10.

d. There is no significant difference in ease of selection between computer generation of random numbers and systematic selection. Some auditors prefer the use of random numbers because they believe this helps ensure an unbiased sample.

e. Monetary unit sampling would be used because (1) it is efficient and (2) it focuses on large dollar items.

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17-27 (see text Web site for Excel solution for part a. - Filename **P1727.xls**)

a. The differences that were uncovered include only four misstatements rather than seven. Items 2, 5, and 7 are not misstatements, but only timing differences. Therefore, only the four misstatements are summarized in order to compute the upper misstatement bound. These misstatements are summarized below. Calculation in Excel can be performed using **P1727.xls**.

ITEM	RECORDED VALUE	AUDITED VALUE	FACTUAL MISSTATEMENT	MISSTATEMENT/ RECORDED VALUE
1	$2,728.00	$2,498.00	$ 230.00	.084
3	3,890.00	1,190.00	2,700.00	.694
4	815.00	785.00	30.00	.037
6	3,215.00	3,190.00	25.00	.008
Totals	$10,648.00	$7,663.00	$2,985.00	

The calculation of the misstatement bound is given below:

(a) TAINTING	(b) SAMPLING INTERVAL	(c = a x b) PROJECTED MISSTATE-MENT	(d) INCREMENTAL CHANGE IN CONFIDENCE FACTOR	(e = c x d) PROJECTED MISSTATEMENT PLUS INCREMENTAL ALLOWANCE FOR SAMPLING RISK
.694	19,750	13,707	1.58	21,657
.084	19,750	1,659	1.44	2,389
.037	19,750	731	1.36	994
.008	19,750	158	1.31	207
Totals		16,255		25,247
Add basic precisions		19,750 x 2.31		45,623
Upper misstatement bound				70,870

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17-27 (continued)

b. The population is not acceptable as stated because upper misstatement bound exceeds tolerable misstatement.

In this situation, the auditor has the following options:

1. Segregate a specific type of misstatement and test it separately (for the entire population). The sample would then not include the specified type of misstatement since it is being tested separately.
2. Increase the sample size.
3. Adjust the account balance (i.e., propose an adjustment).
4. Request the client to review and correct the population.
5. Consider qualifying the opinion if the client refuses to correct the problem.
6. Consider the criteria used in the test, possibly in connection with additional audit work in areas outside of accounts receivable.

Of these options, the auditor is likely to increase the sample size to obtain a better estimate of the likely amount of projected misstatement in the population, and propose a sufficient adjustment so that the upper misstatement bound after adjustment is less than tolerable misstatement.

17-28 a. The audit approach of testing all three account balances is acceptable. This approach is also desirable when the following conditions are present:

1. The auditor can obtain valid, reliable information to perform the required tests in all of the areas.
2. The internal controls for each of the three areas are comparable.
3. Misstatements are expected to occur evenly over the entire population. For instance, the auditor does not expect a large number of misstatements in accounts receivable and few, if any, in inventory.

b. The required sample size for all three accounts is:

Confidence factor (10% ARIA , no expected misstatements	2.31
÷ Tolerable misstatement as percentage of population ($100,000 ÷ $10,000,000)	÷ .01
= Sample size	231

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17-28 (continued)

c. The required sample sizes if each account is tested separately are:

ACCOUNT	TOLERABLE MISSTATEMENT AS PERCENTAGE OF POPULATION	APPROX. SAMPLE SIZE
Accounts receivable	$n = \frac{100{,}000}{3{,}600{,}000} = .028$	2.31/.028 = 83
Inventory	$n = \frac{100{,}000}{4{,}800{,}000} = .021$	2.31/.021 = 110
Marketable securities	$n = \frac{100{,}000}{1{,}600{,}000} = .063$	2.31/.063 = 37

Because the auditor used the same measure of tolerable misstatement for each test, the sum of the individual sample sizes is approximately equal to the sample size for the combined test. However, if the auditor had used a larger measure of tolerable misstatement for the combined test, which is likely, the sample size would be much smaller following the combined approach.

d. The population would be arranged so that all accounts receivable would be first, followed by inventory and marketable securities. The items would be identified by the cumulative totals. In the example, the number 4,627,871 would relate to an inventory item since it is between the cumulative totals of $3,600,000 and $8,400,000. Accordingly, for this number the inventory audit procedures would be performed.

e. The misstatement data are as follows:

RECORDED AMOUNT	AUDITED AMOUNT	DIFFERENCE	MISSTATEMENT/ RECORDED AMOUNT
$987.12	$887.12	$100.00	10.1%

With a sample of 200, the sampling interval is $50,000, which is the combined population divided by the total sample size (10,000,000 ÷ 200):

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17-28 (continued)

The calculation of the upper misstatement bound is:

(a) TAINTING	(b) SAMPLING INTERVAL	(c = a x b) PROJECTED MISSTATE-MENT	(d) INCREMENTAL CHANGE IN CONFIDENCE FACTOR	(e = c x d) PROJECTED MISSTATEMENT PLUS INCREMENTAL ALLOWANCE FOR SAMPLING RISK
.101	50,000	5,050	1.58	7,979
Add basic precisions		50,000 x 2.31		115,500
Upper misstatement bound				123,479

Based on the sample results and the stated combined acceptable misstatement of $100,000, the population (i.e., accounts receivable, inventory, and marketable securities *combined*) should not be accepted as stated without further testing. The unacceptable results occurred because a misstatement was found, but no misstatements were expected when planning the sample.

17-29 1. (a) 2. (d) 3. (c) 4. (a) 5. (d)

17-30 (see text Web site for Excel solution for part a.- Filename **P1730.xls**)

This is an excellent problem to use a spreadsheet to solve, as it requires a great deal of computational work. Important points to stress are:

1. The spreadsheet program is set up in two sections: one for data entry and one for computations.
2. Cells are set up for variables by name, and the values for the variables are then entered in those cells (e.g., sample size =_____). Computations are then done by reference to the cells rather than by entering values in the formulas. This allows the worksheet to be used as a general program for similar problems.
3. Although the program assures computational accuracy, the formulas *must be correct*. They should always be reviewed and double checked, and test data should be processed to assure accuracy.

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17-30 (continued)

a. Calculating the point estimate:

$$\hat{E} = N \bullet \sum \frac{e_j}{n}$$

$$\hat{E} = 1840 \bullet \frac{173.69}{80}$$

$$\hat{E} = 3994.87$$

Before computing the computed precision interval, we must compute the standard deviation:

	e_j	$(e_j)^2$
$SD = \sqrt{\frac{\sum (e_j)^2 - n(\bar{e})^2}{n-1}}$ $= \sqrt{\frac{16{,}521.79 - 80\left(\frac{173.69}{80}\right)^2}{80-1}}$ $= 14.30$	(72.00) 65.70 41.10 36.10 51.80 (.12) 30.00 21.11 $173.69	5,184.00 4,316.49 1,689.21 1,303.31 2,683.24 .01 900.00 445.63 16,521.79

Computed precision interval:

$$CPI = NZ_A \bullet \frac{SD}{\sqrt{n}} \bullet \sqrt{\frac{N-n}{N}}$$

$$CPI = 1{,}840 \bullet 1.64 \bullet \frac{14.30}{\sqrt{80}} \bullet \sqrt{\frac{1{,}840 - 80}{1{,}840}}$$

$$CPI = \$4{,}718.46$$

The confidence interval is expressed as 3,994.87 ± 4,718.46.

To compute the confidence limits,

UCL = Ê + CPI = 3,994.87 + 4,718.46 = 8,713.33

LCL = Ê - CPI = 3,994.87 - 4,718.46 = -723.59

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17-30 (continued)

b. The auditor should not accept the book value of the population since the maximum misstatement in the population that she was willing to accept, $6,000, at a risk level of 5%, is less than the possible amount of true misstatement indicated by the UCL of $8,713.33.

c. The options available to the auditor at this point are:

1. Perform expanded audit tests in specific areas.
2. Increase the sample size.
3. Adjust the account balance.
4. Request the client to correct the population.
5. Refuse to give an unqualified opinion.

■ Cases

17-31 (see text Web site for Excel solution for part d.- Filename **P1731.xls**)

a. *Determination of ARIA* - Note that there are many ways to estimate ARIA. One method is as follows:

ARIA = AAR / (IR x CR x SAPR)
= .05 / (.8 x .5 x 1.0)
= .05 / .4
= .13 rounded to .10 (to be conservative)

Where SAPR = Substantive analytical procedures risk, or the risk that substantive analytical procedures fail to detect a material misstatement.

Tolerable misstatement as a percent:

= TM / Population
= 800,000 / 12,000,000
= .067 rounded to .06 (to be conservative)

Sample size assuming an expected misstatement of zero:

Confidence factor (10% ARIA , no expected misstatements)	2.31
Tolerable misstatement as percentage of population	÷ .06
= Sample size	38

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17-31 (continued)

b. *Determination of ARIA* - Note that there are many ways to estimate ARIA. One method is as follows:

ARIA = AAR / (IR x CR x APR)
= .05 / [1.0 x .8 x (1 - .6)]
= .05 / .32
= .16 rounded to .15

Expected misstatement as a percent of tolerable misstatement:

1% error in inventory of 23,000,000	= 230,000
Tolerable misstatement	÷ 800,000

= .29 rounded to .30

Tolerable misstatement as a percent:

= TM / Population
= 800,000 / 23,000,000
= .035 rounded to .03 (to be conservative)

Confidence factor	
(15% ARIA, 0.30 expected misstatement	3.41
Tolerable misstatement	
as percentage of population	÷ .03
= Sample size	114

c. The same ARIA must be used for the entire combined test. It would be most prudent to use the lower of the ARIAs calculated for the separate tests (i.e., 10% from the example shown in requirement a.).

Expected misstatement as a percent of tolerable misstatement:

1% error in inventory of 23,000,000	= 230,000
Tolerable misstatement	÷ 800,000

= .29 rounded to .30

Tolerable misstatement as a percent:

= TM / Population
= 800,000 / (12,000.000 + 23,000,000)
= 800,000 / 35,000,000
= .023 (rounded to .02)

Confidence factor	
(10% ARIA , 0.30 expected misstatement	4.33
Tolerable misstatement	
as percentage of population	÷ .02
= Sample size	217

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17-31 (continued)

It may seem counterintuitive that the sample for the combined test is larger than the sum of the sample sizes for the individual tests. This is primarily because the same tolerable misstatement is used for the combined test as the individual tests. The auditor may be able to justify using a larger measure of tolerable misstatement, which would decrease the sample size.

d. The generation of random numbers using Excel (**P1731.xls**) to obtain the sample of 38 accounts receivable for confirmation would be obtained as follows:

Population book value = $12,000,000

Command to obtain each random number:

=RANDBETWEEN(1,12000000)

Once the formula is entered, it can be copied down to select additional random numbers. To obtain a sorted list, the list of random numbers should be copied to a separate column, and pasted as a value (use the "Paste Special" command and select "value"). Then use the "Data Sort" command to obtain a sorted list.

The command for selecting the random numbers can be entered directly onto the spreadsheet, or can be selected from the formula tab (math & trig functions). It may be necessary to add the analysis tool pack to access the RANDBETWEEN function.

17-32 (see text Web site for Excel solution for part b.- Filename **P1732.xls**)

a. This nonstatistical (i.e., nonprobabilistic or judgmental) sample is considered to be an unstratified sample since all 23 items over $10,000 were examined 100%. The remaining 7,297 items were tested with a sample of 77 items. Although this was not a probabilistic sample, auditing standards require that in the auditor's judgment, it is a representative one. Accordingly, the results must be projected to the population and a judgment made about sampling risk, although sampling risk and precision cannot be measured.

Projection of the total population misstatement would be as follows:

Items over $10,000:

Projected Misstatement = Audited value - Recorded value
= 432,000 - 465,000
= (33,000) overstatement

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17-32 (continued)

Items under $10,000 - average misstatement amount method:

Projected Misstatement = Average sample misstatement x population size
= [(4,350) / 77] x (7,320 - 23)
= (56.49) x 7297
= (412,207) overstatement

Items under $10,000 - proportional amount method:

Projected Misstatement = Sample misstatement ratio x population book value
= [(4,350) / 81,500] x (2,760,000 – 465,000)
= (.053) x 2,295,000
= (121,635) overstatement

Where sample misstatements are:

ITEM	AUDITED VALUE	RECORDED VALUE	MISSTATEMENT
12	4,820	5,120	(300)
19	385	485	(100)
33	250	1,250	(1,000)
35	3,875	3,975	(100)
51	1,825	1,850	(25)
59	3,780	4,200	(420)
74	0	2,405	(2,405)
Totals	14,935	19,285	(4,350)

Note that the sample misstatements are divided by the sample book value of $81,500 to calculate the sample misstatement ratio. The projected misstatement is significantly lower using the proportional amount method because the average account size in the sample is larger than the average account size in the population.

Total misstatement is either:

(33,000) + (412,207) = (445,207) overstatement

or

(33,000) + (121,635) = (154,635) overstatement

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17-32 (continued)

In either case, the following can be said: There are a significant number of misstated items in the sample, and the amount is quite large. Since the sample is representative, it is clear that there is a material misstatement of the population. The amount of misstatement is not easily estimable from the sample. It could be significantly higher or lower than either point estimate. At this point, the best course of action would be to ask the client to make a study of their records for all population items to identify more accurately the misstatements that exist and correct them.

b. If this were a PPS sample, the sampled portion would be evaluated as follows:

Misstatement taintings:

ITEM	AUDITED VALUE	RECORDED VALUE	MISSTATEMENT	PERCENT
12	4,820	5,120	(300)	(.058)
19	385	485	(100)	(.206)
33	250	1,250	(1,000)	(.800)
35	3,875	3,975	(100)	(.025)
51	1,825	1,850	(25)	(.014)
59	3,780	4,200	(420)	(.100)
74	0	2,405	(2,405)	(1.000)

The calculation of the overstatement bound for the sampled population is given on the following page. The sampling interval is $29,805 ([$2,760,000 – 465,000)]/77).

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17-32 (continued)

(a) TAINTING	(b) SAMPLING INTERVAL	(c = a x b) PROJECTED MISSTATE-MENT	(d) INCREMENTAL CHANGE IN CONFIDENCE FACTOR	(e = c x d) PROJECTED MISSTATEMENT PLUS INCREMENTAL ALLOWANCE FOR SAMPLING RISK
1.00	29,805	29,805	1.75	52,159
.800	29,805	23,844	1.55	36,958
.206	29,805	6,140	1.46	8,964
.100	29,805	2,981	1.40	‘4,713
.058	29,805	1,729	1.36	2,351
.025	29,805	745	1.33	991
.014	29,805	417	1.30	542
Totals		65,661		106,678
Add basic precisions		29,805 x 3.00		89,415
Upper misstatement bound				196,093

Upper misstatement bound from sample	196,093
Misstatement of 100% items	33,000
Total overstatement bound	229,093

A template for the PPS portion of the problem is prepared using Excel on the text Web site (Filename **P1732.xls**). This template is a complete worksheet for MUS, including appropriate tables for various exception rates and risk levels. You will note that the results are very similar to those computed manually, with the differences being due to rounding.

17-33 ACL Problem

a. The total amount of the outstanding invoices is $893,619.03. Based on confidence level of 90%, materiality of $50,000, and expected errors of $2,500, the sample size is 44 and the sampling interval is $19,935.06.

b. If materiality is increased to $60,000 and expected errors are decreased to $1,000, the revised sample size is 35 and the revised sampling interval is $25,290.04.

c. No answer required. The sample is provided on the following page; only the invoice number, customer number, invoice date, and invoice amount are included.

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17-33 ACL Problem (continued)

invoice number	customer number	invoice date	invoice amount
173640036989	0260797	2/11/2014	25011.4
173640037011	0242798	2/10/2014	13753.12
173640037536	0244434	4/22/2014	3429.66
173640037593	0252175	4/30/2014	17004.23
173640037693	0236320	5/3/2014	11115.81
173640038411	0243854	6/15/2014	27173.13
173640038744	0237175	7/1/2014	6052.44
173640038911	0249158	7/12/2014	28821.31
173640039362	0259570	8/10/2014	13519.56
173640039521	0235160	8/24/2014	9587.28
173640039647	0253578	8/26/2014	15741.48
173640040049	0253788	9/17/2014	3036.8
173640040153	0252448	10/13/2014	10972.27
173640040293	0248604	10/12/2014	14133.79
173640040377	0264539	10/12/2014	18666.34
173640040415	0247433	10/18/2014	20320.17
173640040503	0251970	10/21/2014	5750.41
173640040573	0236508	11/5/2014	3980.42
173640040605	0257213	10/28/2014	17143.72
173640040631	0248346	10/29/2014	6294.89
173640040664	0261976	11/9/2014	20569.66
173640040680	0252465	11/9/2014	2431.97
173640040720	0240055	11/17/2014	6661.59
173640040731	0259568	11/19/2014	15432.77
173640040772	0258661	12/3/2014	15356.38
173640040782	0234884	12/2/2014	15545.3
173640040797	0238961	12/3/2014	24142.46
173640040802	0257582	12/16/2014	6724.86
173640040816	0243802	12/3/2014	15574.82
173640040817	0258807	12/1/2014	14932.8
173640040821	0245569	12/7/2014	28542.97
173640040822	0250585	12/15/2014	27191.46
173640040832	0244664	12/13/2014	21167.14
173640040838	0262871	12/6/2014	6107.62
173640040852	0234230	12/7/2014	4635.68
173640040864	0242115	12/14/2014	15486.06
173640040875	0236705	12/24/2014	24763.72
173640040877	0251255	12/23/2014	6163.95
173640040901	0263666	12/31/2014	8396.13
173640040911	0250021	12/24/2014	25454.3
173640040912	0260018	12/29/2014	16846.11
173640040920	0251367	12/27/2014	19521.23

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17-33 ACL Problem (continued)

d. Using a sampling interval of $19,935.06 and a start of 3179, the sample size is 42. The sample size is less than 44 because some invoices are included twice in the sample because they are larger than the sampling interval.

e. The largest invoice selected for testing is $28,821.31. There are 11 invoices in the sample that are larger than the sampling interval of $19,935.06. There are also 11 invoices larger than the sampling interval in the population. Using interval sampling, all items in the population greater than the sampling interval will be included in the sample.

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