

Inventory Analysis

Introduction What are the risks associated with Inventory that could be addressed by computer assisted audit procedures? And what tests can help address those risks? This section summarizes the business and audit risks that arise in the context of Inventory and the potential tests that can be used to address those risks.

Potential Risks

The following table identifies the key risks, explains the business and audit implication of each risk and the audit objectives that could be addressed by audit tests.

	RISK	IMPLICATIONS	AUDIT OBJECTIVES
1	Inventory is not correctly recorded.	Management will not have accurate information to manage inventory (i.e., ordering) effectively. Inventory could be materially misstated on the financial statements	Accuracy, Existence, Validity
2	Inventory management reports have inadequate supporting information.	Management may identify issues, but may not be able to “drill down” and identify the root cause of issues. This, in turn, hampers management’s ability to make effective decisions.	Existence, Validity, Valuation
3	Quantity of inventory is not maintained within the specified range.	If too much inventory is maintained then there is an increased risk of obsolescence and additional storage costs (i.e., for keeping the inventory). If too little inventory is maintained, then the company will not be able to meet the customer demand.	Valuation
4	Obsolete inventory items are not identified	Management will not be able to make proper decisions on getting rid of obsolete items. From an audit point of view, obsolete items may need to be revalued if the market price is less than their cost.	Valuation
5	Differences between the physical inventory and the inventory on the system are not identified.	Management will not have reliable information to make inventory management decisions. Also, it may have a problem in terms of identifying shrinkage. From an audit perspective, the inventory could be materially misstated on the financial statements.	Existence, Validity
6	Items are not recorded in the correct period.	Financial statements, i.e., inventory and cost of goods sold, could be materially misstated.	Cut-off
7	Gaps in sequentially numbered documents are not accounted for.	Inventory tags, transaction numbers and other information may be missing and not accounted for. This would undermine the control that is provided by inventory tags.	Completeness

Potential Tests

The following tests are suggested when analyzing an inventory system. However the exact tests carried out for a particular client will depend upon the system used and the data available. Common tests include:

Mechanical Accuracy and Valuation

- Total the file, providing sub-totals of the categories of inventory.
- Re-perform any calculations involved in arriving at the final stock quantities and values.
- Re-perform material and labor cost calculations on assembled items.

Analysis

- Age inventory by date of receipt.
- Compute the number of months each inventory item is held based on either sales or purchases. Produce a summary of this information.
- Stratify balances by value bands.
- Analyze gross profit.
- Analyze price adjustment transactions.

Exception Tests - Existence and Valuation

- Identify and total inventory held in excess of maximum and minimum inventory levels.
- Identify and total obsolete or damaged inventory (identified as such in the database).
- Identify balances in excess of a reasonable usage period that are probably obsolete.
- Identify items past their shelf life (if a sell by date or bought date is present on the system).
- Identify any items with excessive or negligible selling or cost prices.
- Identify differences arising from physical stock counts.
- Test for movements with dates or reference numbers not in the correct period (cut-off).
- Identify balances that include unusual items (i.e., adjustments).
- Identify work in progress that has been open for an unreasonable period.
- Identify inventory acquired from group companies.

Gaps and Duplicates

- Test for missing inventory ticket numbers.
- Test for missing transaction numbers.
- Identify duplicate inventory items.

Matching and Comparison Tests

- Compare files at two dates to identify new or deleted inventory lines or to identify significant fluctuations in cost or selling price.
- Compare cost and selling price and identify items where cost exceeds net realizable value.
- Compare holdings and inventory turnover per product between stores.

**Case Scenario:
Inventory**

The Chief Financial Officer of Bright IDEAs Inc. has called to say he has identified some problems with the inventory system and would like you to help analyze the extent of these problems. In particular, although only 36 items are identified as obsolete on the system, he thinks there are considerably more obsolete lines that need clearing out. They are also suffering from frequent stockouts and he is convinced that their margin analysis is not accurate and that re-order levels are incorrect.

He supplies you with the following information:

- There are 767 product lines in the database.
- **Bright IDEAs Inc.** has three depots based in Ottawa, Toronto and Quebec.
- The file is as of December 31, 2015.

You agree on the following:

- To check the system calculation of the obsolescence provision, to prepare an analysis of inventory and usage, and to suggest an appropriate provision.
- To identify items with apparent incorrect re-order levels.
- To perform an analysis of profit margins on different lines.

Note: There is normally a master or balances file that contains details of inventory holdings at a particular date. Costs may be held in a separate file. The transaction history can be particularly useful although file sizes are often quite large. Selling prices normally have to be picked up from a separate file.

Retailers often have point-of-sale systems that may collect large volumes of useful data that IDEA can analyze.

Obtaining the Data The data file used for this exercise will be: **Inventory on hand at December 31, 2015.**

Explanation of the ASCII Delimited File Format

ASCII delimited files are a common format of variable length file where each field is only long enough to contain the data stored within it. This is an advantage with text fields such as names, addresses, narratives, etc.

In order for software to use such data files, there is a separator (a special character) at the end of each field within the record. Additionally text fields may be enclosed (encapsulated) with another character, typically quotation marks (" ").

The separator is often a comma (,) and such files are known as **comma separated value (CSV)**. However, the separator could be another ASCII character, for example a colon (:) or a semicolon (;). These files are referred to as **ASCII Delimited** (comma separated files are also often referred to as **ASCII Delimited**).

There must also be a record delimiter at the end of each record, typically the carriage return (<CR>) and line feed (<LF>) characters, or sometimes only the line feed character.

When this type of file is imported, a fixed length database is created within IDEA.

Example of an ASCII Delimited - CSV:

"6776",1865,1,190,"04-02-2006"<CR><LF>

"6714",1865,1,97,"04-02-2006"<CR><LF>

"11905",2366,10,9,"25-02-2006"<CR><LF>

"7555",4352,1,79,"03-03-2006"<CR><LF>

"4547",4815,5,17,"03-03-2006"<CR><LF>

"6344",4815,1,7,"03-03-2006"<CR><LF>

"151",2366,1,3,"29-03-2006"<CR><LF>

"145",2366,1,1,"05-08-2006"<CR><LF>

"206",2366,1,2,"29-03-2006"<CR><LF>

"207",2366,1,3,"29-03-2006"<CR><LF>

Request for Data Files for Analysis Purposes

Please supply the following data from the Inventory system in **ASCII Delimited** format:

FIELD NAME	TYPE	DEC	DESCRIPTION
PRODCODE	N	0	Product Code
DEPOT	C		Depot name
QTY	N	0	Quantity on hand
AV_COST	N	3	Average cost for item
TOTALCOST	N	3	QTY*AV_COST
OBSOLETE	C		Obsolete = "Y"
MAX	N	0	Maximum inventory level on hand
MIN	N	0	Minimum inventory level on hand
DELQTY	N	0	Last delivery quantity
ORDERNO	N	0	Last delivery order number
DELDATED	D		Date of last delivery YYYYMMDD
CURSELLPRI	N	2	Current selling price
CUREFFDATE	D		Date selling price effective YYYYMMDD
PREVSELPRI	N	2	Previous selling price
USAGE	N	0	Sales quantity in current year
PREVCOST	N	3	Unit cost of last purchase

Data is required for the following period: December 31, 2015

Please also supply the following control totals for reconciliation purposes:

- Total cost of inventory on hand at December 31, 2015.
- Number of transactions supplied, i.e., product lines.
- Record definition to support the data file provided.

Work Plan From the available/possible tests the audit manager decides on the appropriate tests and prepares the following Work Plan for you to complete.

Objective:

To check the system calculation of obsolesce provision, to prepare an analysis of inventory and usage, and to suggest an appropriate provision.

	AUDIT PROCEDURES	WORK DONE BY (INITIALS)	EXTENT OF TESTING
1	Obtain the data files from the client and load into the PC. Load IDEA and set a Working Folder for the Inventory Audit for Bright IDEAs Inc.		
2	Agree the total value of inventory: a) Import the inventory data; b) Check the total; c) Compute field statistics; and d) Reconcile control totals.		
3	Consider the adequacy and accuracy of inventory provisions: a) Test the accuracy of the provisioning report; b) Compute the usage figures and ratios for all stock lines and calculate an alternative provision; and c) Analyze the provision by depot.		
4	Consider the accuracy of the re-ordering system and test for items that are not being ordered frequently enough.		
5	Analyze profit margins and pricing by sales bands and identify items with inappropriate or questionable pricing: a) Items with no selling price; and b) Major pricing movements.		

Project Setup *Objective:*

To be able to start an assignment including loading data, running IDEA and creating a **Project** for the client within IDEA.

Exercise Description:

This exercise covers copying data into a folder, loading IDEA and creating a new **Project** for the client.

IDEA Functionality Covered:

- Creating a **Project**
- Entering project properties

The following data files have been provided on the CD supplied with this Workbook:

- Inventory 2015.ASC – Inventory on hand at December 31, 2015

Accessing IDEA

From the Windows Start menu, select **Programs > IDEA > IDEA**.

Alternatively, click the IDEA shortcut icon on the desktop, if available. IDEA will load.

Create a Project and Enter Project Information

To facilitate housekeeping, it is recommended that a separate **Project** be used for each audit, investigation or analysis.

All information relating to this analysis, including data files, equations, views or report definitions, import definitions, etc. may be stored in the **Project**.

This exercise will explain how to create a **Project** and enter project information that will be printed on all reports.

Note that once a **Project** is set, it remains the active folder until changed.

1. To create a new **Project**, from the **Home** tab, in the **Projects** group, click **Create**.

The **Create Project** dialog box appears.

2. Select **Managed Project** and enter **Inventory Audit** as the directory name, this will create a new folder:

C:\Users\[UserID]\Documents\My IDEA Documents\IDEA Projects\Inventory Audit

3. Click **OK**.

Inventory Audit will become the **Project**, closing the previously active **Project**.

4. From the **Home** tab, in the **Projects** group, click **Properties**.

The **Project Properties** dialog box appears.

5. Enter the following:

- **Report name:** Inventory Audit
- **Report period:** Jan 1, 2015 to Dec 31, 2015

The project properties will be stored in a file called **Client.inf** in the **Project Folder**.

6. The following data files have been provided on the CD supplied with this Workbook:

- Inventory 2015.ASC – Inventory on hand at December 31, 2015

7. Copy the above data file into the folder using Window File Explorer. The folder is:

C:\Users\[UserID]\Documents\My IDEA Documents\IDEA Projects\Inventory Audit\Source Files.ILB

Import the Inventory File

Objective:

To import the data file for testing.

Exercise Description:

The year-end inventory file has been provided in a format known as ASCII Delimited.

In order to load this file it is necessary to define its format to IDEA. The Import Assistant will guide you through the steps to define and import the file for testing.

IDEA Functionality Covered:

- Access the **Import Assistant**
- Build a record definition for an **ASCII Delimited** file
- Save the definition
- Import the database into IDEA
- Select a numeric control amount field for the database

You have been provided with an ASCII Delimited file:

- **Inventory 2015.asc** – the Inventory file as at December 31, 2015.

1. From the **Home** tab, in the **Import** group, click **Desktop**.
2. Select **Text** from the list. Click the **Browse** button and the **Select File** dialog box will be displayed. Navigate to and select the **Inventory 2015.asc** file from the **Project Import Folder**. Click **Open** and then click **Next**.

- The **Import Assistant - File Type** screen will be displayed. Ensure **Delimited** is selected as the correct file type.

Import Assistant - File Type

The Import Assistant has examined the file and has determined that it is a delimited file.
If this is not correct, please select the correct file type.

☒ Delimited
☐ Fixed Length
☐ EBCDIC Fixed Length

Options

	10.....20.....30.....40.....50.....60	
1	110211059QUEBEC32 4.368139.7761002 51876094820151204	9
2	111201103OTTAWA125 3.511438.875300 10070760474201511	0
3	111601902QUEBEC670 0.69462.3900200 54076084820151203	1
4	111807059QUEBEC684 0.591404.244750 10043276094920151	2
5	111807558QUEBEC61 1.877114.4973001 00487609502015120	4
6	111813056TORONTO99 00.548542.523000 5009007609512015	1
7	111815558QUEBEC140 0.57179.9450010 01507605162015111	4
8	111821608OTTAWA360 0.482173.523881 69400760849201512	0
9	111821703QUEBEC380 0.401152.384041 27200760851201512	0
10	111821809TORONTO25 00.46115250100 15076085220151203	1
11	111824705QUEBEC320 0.652208.644311 66200760853201512	0
12	113219101QUEBEC93 .29929.691Y7412 760386201510187.5	9
13	113401101TORONTO63 0.8553.5512563 60760952201512042	.

< Back Next > Cancel Help

- View the data and determine the field separator and the record delimiter.
- Click **Next**.

6. The **Import Assistant** will try to determine the **Field Separators** and **Text Encapsulators** (if any) for the file. Accept the defaults and click **Next** to proceed.

Import Assistant - Specify Field Separator and Text Encapsulator

Please inspect the file displayed in the preview and make changes, if required, in the options below.

Field Separator
 Delimited files use a special character to separate fields. Please inspect the file below and, if required, change the Field Separator selected.

☐ Comma
 ☐ Colon
 ☐ Semicolon
 ☒ Tab
 ☐ Space
 ☐ Other

Text encapsulator: Header lines to ignore: 0

☐ First visible row is field names

1	110211059	QUEBEC	32	4.368	139.776	100	25	18	760948	20151
2	111201103	OTTAWA	125	3.511	438.875	300	100	70	760474	20151
3	111601902	QUEBEC	670	0.69	462.3	900	200	540	760848	20151
4	111807059	QUEBEC	684	0.591	404.244	750	100	432	760949	20151
5	111807558	QUEBEC	61	1.877	114.497	300	100	48	760950	20151
6	111813056	TORONTO	990	0.548	542.52	3000	500	900	760951	20151
7	111815558	QUEBEC	140	0.571	79.94	500	100	150	760516	20151
8	111821608	OTTAWA	360	0.482	173.52	388	169	400	760849	20151
9	111821703	QUEBEC	380	0.401	152.38	404	127	200	760851	20151
10	111821809	TORONTO	250	0.46	115	250	100	150	760852	20151
11	111824705	QUEBEC	320	0.652	208.64	431	166	200	760853	20151

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Note: Some (but not this) ASCII Delimited files have field names as the first row of the file. To use these as field names, select the First visible row is field names option.

The **Import Assistant - Field Details** step will be displayed.

7. Click on each field heading in turn and using the record definition, define the field details.

FIELD NAME	TYPE	DEC	DESCRIPTION
PRODCODE	N	0	Product Code
DEPOT	C		Depot name
QTY	N	0	Quantity on hand
AV_COST	N	3	Average cost for item
TOTALCOST	N	3	QTY*AV_COST
OBSOLETE	C		Obsolete = "Y"
MAX	N	0	Maximum inventory level on hand
MIN	N	0	Minimum inventory level on hand
DELQTY	N	0	Last delivery quantity
ORDERNO	N	0	Last delivery order number
DELDATED	D		Date of last delivery YYYYMMDD
CURSELLPRI	N	2	Current selling price
CUREFFDATE	D		Date selling price effective YYYYMMDD
PREVSELPRI	N	2	Previous selling price
USAGE	N	0	Sales quantity in current year
PREVCOST	N	3	Unit cost of last purchase

8. Enter the correct field name in the **Field name** box. The **Import Assistant** suggests the file type for that field in the **Type** box. If this is incorrect then change it to the file type specified in the record definition.
9. Enter the description of the field in the **Description** box.
10. If the field is a Numeric field with decimals, it is necessary to specify whether or not the decimals are implied. However, in this database if there are decimals, the decimal place is stored in the number, therefore the **Implied decimals** box must **not** be selected. Specify the number of decimals in the **Number of decimals** box.

11. Define the Date fields as type **Date**, i.e., change the **Character** to **Date** in the **Type** box. A mask must be defined for the Date fields. Click the **Date Mask** box and enter the appropriate date format i.e., **YYYYMMDD**.

Import Assistant - Field Details

You can now specify field details. Select a field by clicking on the column heading below, and then modify its information below.

Field name: Type:

Description: Number of decimals:

☐ Do not import this field ☐ Implied decimals

Converted Example

	ORDERNO	DELDATED	URSELLPR	UREFFDAT	REVSSELLP	USAGE	PREVCOST
1	760948	20151204	9.15	20150513	8.45	535	4.02
2	760474	20151108	8.75	20150812	7.95	794	3.694
3	760848	20151203	1.49	20151202	1.35	2488	0.638
4	760949	20151204	1.09	20150413	0.99	2156	0.55
5	760950	20151204	3.95	20101105	3.55	86	1.732
6	760951	20151204	1.15	20151006	1.05	493	0.504
7	760516	20151114	1.19	20150319	1.05	101	0.525
8	760849	20151203	1.35	20150430	1.29	1011	0.493
9	760851	20151203	1.15	20150606	1.09	3756	0.4
10	760852	20151203	1.29	20150221	1.19	100	0.474

12. Click **Next**.

13. The **Import Assistant – Create Fields** dialog box appears. **Create Fields** allows you to add fields in the imported file. This can be done during the import or at any time while using IDEA. For this exercise, no fields will be added.

Import Assistant - Create Fields

You can add one or more fields to the imported file by entering the field name, type, length, parameter and description for the field(s) in the columns below.

Delete

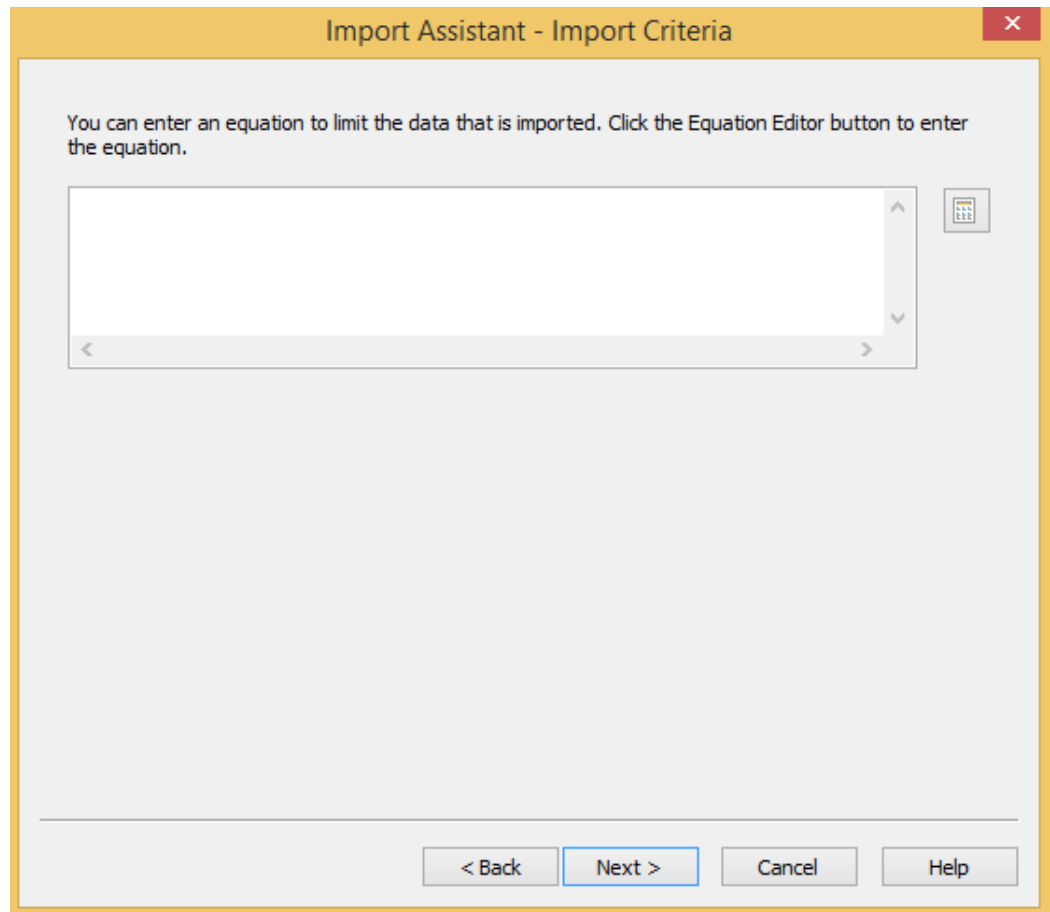
	Field Name	Type	Len	Dec	Parameter	Description
1						
2						

< >

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14. Click **Next**.

The **Import Assistant - Import Criteria** screen appears. We will not be entering criteria for this example.



15. Click **Next**.
16. The definition will automatically be saved in the **Project Import Definitions.ILB**. IDEA will give the definition the same name as the source file. Click the **Browse** button adjacent to the **Save record definition as** box if you want to change the name to something other than **Inventory2015.rdf**.
17. Select the **Generate field statistics** option and enter **Inventory at Dec 31 2015** in the **Database name** box.
18. Click **Finish** to import the file into IDEA.

19. Click the **Control Total** link in the **Properties** window and select the **TOTALCOST** field and then click **OK**.

The control total of **626,963.915** will appear beside the **Control Total** link in the **Properties** window.

There are **767** records as can be seen on the status bar at the bottom of the screen.

You are now ready to verify that the data has been imported correctly and to commence testing.

Verify that the Database Has Been Correctly Imported

Objective:

To prove that data has been imported correctly and that the inventory report is correctly footed.

Exercise Description:

View the Field Statistics for the Numeric fields in the Inventory at Dec 31 2015 database.

The numeric statistics will be used for:

- Agreeing totals
- Getting a general understanding of the ranges of values in the database
- Highlighting potential errors/areas of weakness for focusing on subsequent investigations

IDEA Functionality Covered:

- Viewing **Field Statistics**
- Printing **Field Statistics**

1. Click the **Field Statistics** link in the **Properties** window.

Field Statistics are displayed for the Numeric fields in the database.

Note: The Field Statistics are available instantly as they were generated when the database was imported. Field Statistics are also available for Date fields. These will be reviewed in the following exercise.

2. Study the **Field Statistics** for all Numeric fields, but especially, the **QTY** and **TOTALCOST** fields. Notice in particular the **Net Value**, **Minimum Value**, **Maximum Value**, **# of Zero Items** and **# of Negative Records** field statistics.

Please check your results against the figures below.

Field: QTY

STATISTIC	VALUE	COMMENT
Net Value	214,954	
Absolute Value	214,984	
# of Records	767	
# of Zero Items	68	
Positive Value	214,969	
Negative Value	-15	
# of Positive Records	696	
# of Negative Records	3	These should be identified
# of Data Errors	0	
# of Valid Values	767	
Average Value	280.25	
Minimum Value	-8	Should not be any negative quantities
Maximum Value	10,800	
Record # of Min	202	
Record # of Max	576	
Sample Std Dev	653.53	
Sample Variance	427,098.71	

Field : TOTALCOST

STATISTIC	VALUE	COMMENT
Net Value	626,963.915	
Absolute Value	627,159.615	
# of Records	767	
# of Zero Items	69	Different number for zero-quantity
Positive Value	627,061.765	
Negative Value	-97.850	
# of Positive Records	695	
# of Negative Records	3	
# of Data Errors	0	
# of Valid Values	767	
Average Value	817.424	
Minimum Value	-67.000	
Maximum Value	70,555.641	
Record # of Min	90	
Record # of Max	384	
Sample Std Dev	3,863.12	
Sample Variance	14,923,698.38	

3. If your computer is attached to a printer, print the **Field Statistics** for the **QTY** and **TOTALCOST** fields by clicking the **Print** button on the **Field Statistics** toolbar and selecting each field.
4. The **Field Statistics** reports should be filed with the audit documentation as proof of reconciliation.
5. Return to viewing the database by clicking the **Data** link in the **Properties** window.

Conclusion

The file has been imported correctly and the client's reports reconcile correctly. However there are some negative items and we should identify these and report them to the client.

Identify Obsolete Inventory Items

Objective:

- To check the client's calculation of the obsolescence report.
- To identify obsolete inventory and calculate potential provisions.
- To identify any items with negative quantities or costs.

Exercise Description:

Note that there are obsolete inventory items on the database, denoted by a "Y" in the OBSOLETE field.

- View the Date Field Statistics for the last delivery date to determine the age of inventory items.
- Confirm the client's calculation of obsolete items by reference to the items marked as obsolete. At the same time identify the negative value and quantity items.
- Extract items with inventory on hand and perform a calculation of usage.
- Analyze the inventory by usage and then calculate a provision based on this.
- Analyze the provision by depot.
- Identify any major items for detailed investigation.

IDEA Functionality Covered:

- View and analyze Date **Field Statistics**
- Perform calculations by appending Virtual fields
- Perform multiple extractions
- Copy, paste, and edit similar extraction equations
- Perform summarizations

The first test is to view the Field Statistics for the DELDATED (date of last delivery) field to determine the age of the oldest stock items.

1. Click the **Field Statistics** link in the **Properties** window.
2. In the **Field Type** box, select **Date**.
3. Notice the **Earliest Date**, **Latest Date**, and **# of Zero Items** (i.e., missing dates) statistics for **DELDATED**.

Please check your results against the figures below.

Field: DELDATED

STATISTIC	VALUE	COMMENT
# OF Zero Items	0	Items with no delivery date
Earliest Date	9/21/2001	Old inventory items to be investigated
Latest Date	12/18/2015	

The next test to carry out is to prove the client's obsolescence provision report.

4. Return to viewing the database by clicking on the **Data** link in the **Properties** window.
5. From the **Analysis** tab, in the **Extract** group, click **Direct**.
6. Change the file name to **Obsolete Inventory Items**.
7. To enter the equation, click the **Equation Editor** button. The **Equation Editor** appears and is used to enter the required equation to identify items flagged as obsolete.
8. Enter the expression: **OBSOLETE = "Y"** as follows:
 - Insert **OBSOLETE** into the equation by double-clicking the field name
 - Click the **=** button
 - Click the **"** button
 - Type in **Y** (note the upper case) within the quotes as below

Once the equation has been entered, check the syntax by clicking the **Validate** button. If a syntax error occurs in your equation, correct the expression and recheck the syntax. The equation should be as in the above screen. Click the **Validate and Exit** button but do **not** run the extraction yet.

9. Multiple extractions (up to 50) can be carried out with a single pass through the database. We will use this feature to report the negative items. Click on the next row in the spreadsheet area of the **Direct Extraction** dialog box. Enter the **File name: Negative Quantities**.
10. Click the **Equation Editor** button and enter the following equation: **QTY < 0**.
 - Insert **QTY** into the equation by double-clicking the field name.
 - Type in **<**.
 - Type in **0**.
 - Click the **Validate and Exit** button but do **not** run the extractions yet.

Note: If equations are similar, they can be copied, pasted and edited to save time.

- Double-click to select **QTY < 0** from the **Direct Extraction** box.
- Press **CTRL + C** (to copy to the clipboard).
- Click on the **Equation** text box for the third equation.
- Press **CTRL + V** (to paste from the clipboard).
- Click on the **Equation Editor** button to edit the equation.
- Replace the **QTY** field with **TOTALCOST**.
- Click the **Validate Equation** button to check the syntax (if a syntax error occurs in your equation, correct the equation and recheck the syntax).
- Click the **Validate and Exit** button.
- Change the file name to **Negative Cost Items**.

Direct Extraction

Records to extract: ☒ All ☐ Range ☐ Create a virtual database

Starting record #: 1 Ending record #: 767

Database order: No index

	File Name	Criteria
1	Obsolete Inventory Items	OBSOLETE = "Y"
2	Negative Quantities	QTY < 0
3	Negative Cost Items	TOTALCOST < 0
4		

Buttons: OK, Create Fields, Fields, Delete, Cancel, Help

- Click **OK** to run all 3 extractions with a single pass through the database.
 - The resultant databases will be created and the **Obsolete Inventory Items** database will be displayed.
 - There should be **34** items totaling **\$7,644.270** that you note agrees to the client's report.
 - Open the **Negative Cost Items** database from the **File Explorer**. It should contain **3** items totaling **\$-97.850**.
 - Open and inspect the **Negative Quantities** database. There should be **3** items totaling **\$-30.850**.

12. Close all databases by clicking the **File** tab and then **Close All Databases**.

Conclusion

The client's report is mathematically accurate in footing those items flagged as obsolete. Whether other items should be flagged as obsolete will be tested next. The negative items have now been identified and can be given to the client for correction.

Calculate Usage Ratios and Suggest Obsolescence Provision

Objectives:

To analyze inventory usage and calculate provision.

Exercise Description:

- Calculate the month's worth of inventory on hand, based on the usage over the past 12 months using a Virtual (Calculated) field.
- View the **Field Statistics** of the calculated fields.
- Analyze the inventory into bands of six months using **Stratification**.
- Produce a report, including a chart of the **Stratification** results and optionally email results to the Chief Financial Officer.

IDEA Functionality Covered:

- Add a Virtual field to calculate the number of months of inventory
- Use the following **@Functions**:
 - **@Age**
 - **@If**
- Save an equation
- View **Field Statistics**
- Perform a **Stratification**, including creating a detailed stratification database
- View an extraction preview of exceptions
- Create a report, including a graph of the **Stratification** results
- Export the results to a file or send via e-mail

Calculate Months of Inventory

1. Open **Inventory at Dec 31 2015** as the active database.

Performing a calculation and storing the result in a new column is called **Append a Virtual Field** and is carried out through the **Field Manipulation** task.

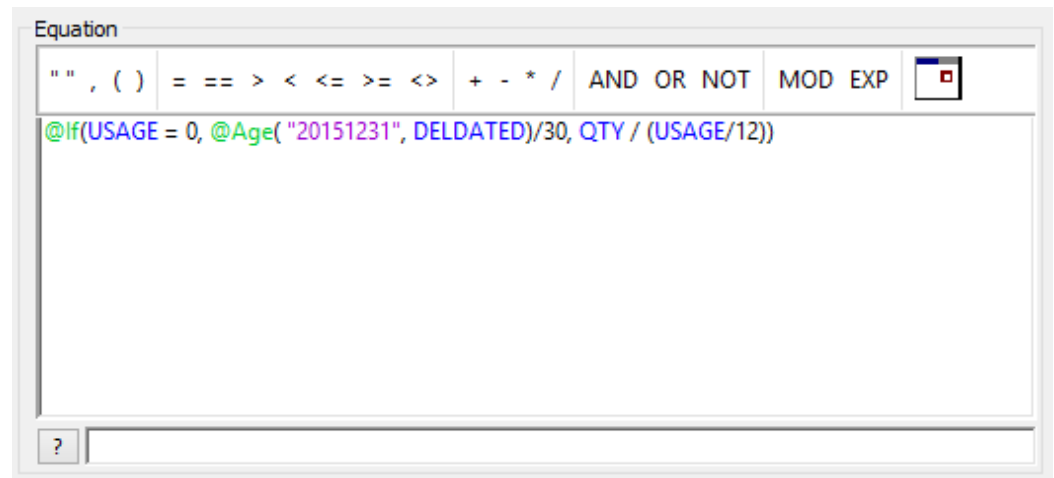
2. Double-click over the Database window to open the **Field Manipulation** dialog.
3. On the **Field Manipulation** dialog box, click **Append** and enter the following details:

- **Field Name:** MONTHS
- **Field Type:** Virtual numeric
- **Field Length:** Do not enter
- **Decimals:** 2
- **Description:** Months of inventory on hand

4. Click in the **Parameter** cell to load the **Equation Editor** and enter the following equation:

@If(USAGE = 0, @Age("20151231",DELDATED)/30 , QTY/(USAGE/12))

- In the **@Functions** area, expand the **Conditional** category. This displays the two conditional **@Functions**, **@Compif** and **@If**.
- Click **@If** and read the help and example in the information area.
- Double-click to select **@If**, inserting it into the **Equation** area, or click **Insert Function**.
- Select the field **USAGE** by double-clicking the field name.
- Continue selecting and typing the relevant items to build the equation. Ensure parentheses are in the correct position.
- The equation should appear as in the screen below.



The following **@Functions** are used in this equation:

- **@Age**: This computes the number of days between two dates, in this case, the number of days between the delivery date and the year-end. An assumption has been made that there are 30 days to a month to give an approximate number of months figure.
- **@If**: This performs a test, in this case whether there is any usage. If the equation $USAGE = 0$ is true then the value after the first comma is used, otherwise the value after the second comma is used.

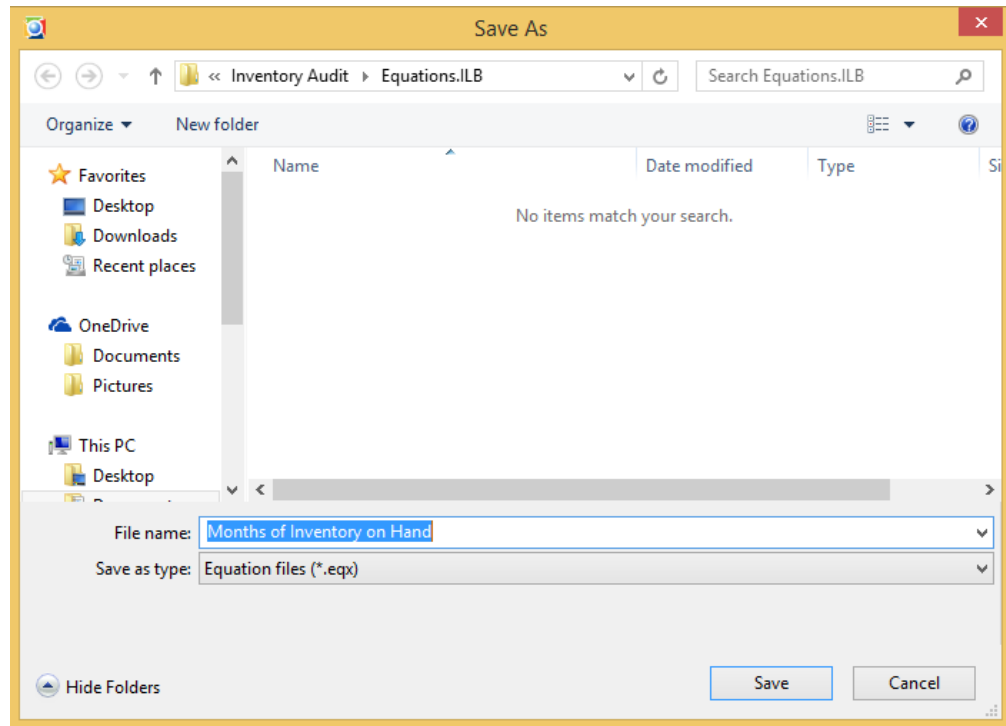
For more help on the **@Functions**, review the associated information for the specific @Function in the Equation Editor.

In the above equation:

- If inventory usage is 0 (i.e., the true condition in @If), the number of months of inventory is calculated as the number of months since the last delivery date, i.e., $@Age("20151231", DELDATED)/30$.
- If there has been usage (i.e., $USAGE <> 0$), the months of inventory on hand is calculated as a ratio of the quantity on hand to the monthly usage, i.e., $QTY/(USAGE/12)$.

As this is a complex equation that may be used again or may require editing, it should be saved. Equations may be saved in any folder however it is recommended that all files relating to the Inventory Audit are stored in the **Project Folder** under the **Equations.ILB** folder.

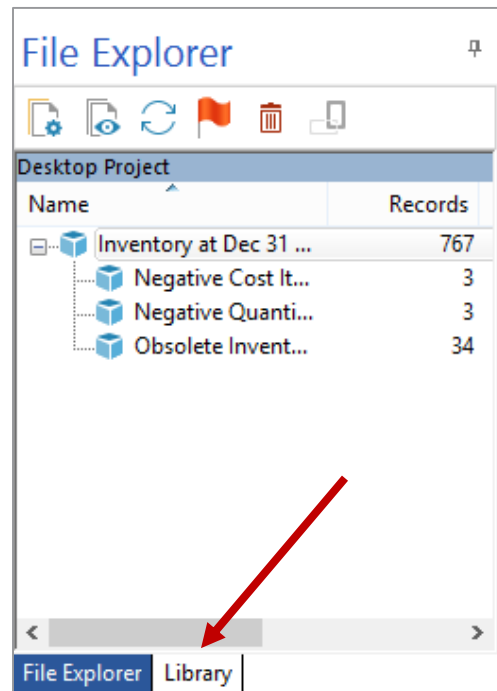
5. Click the **Save Equation** button on the **Equation Editor** toolbar. When the **Save As** dialog box appears, enter the **File name: Months of Inventory on Hand**.



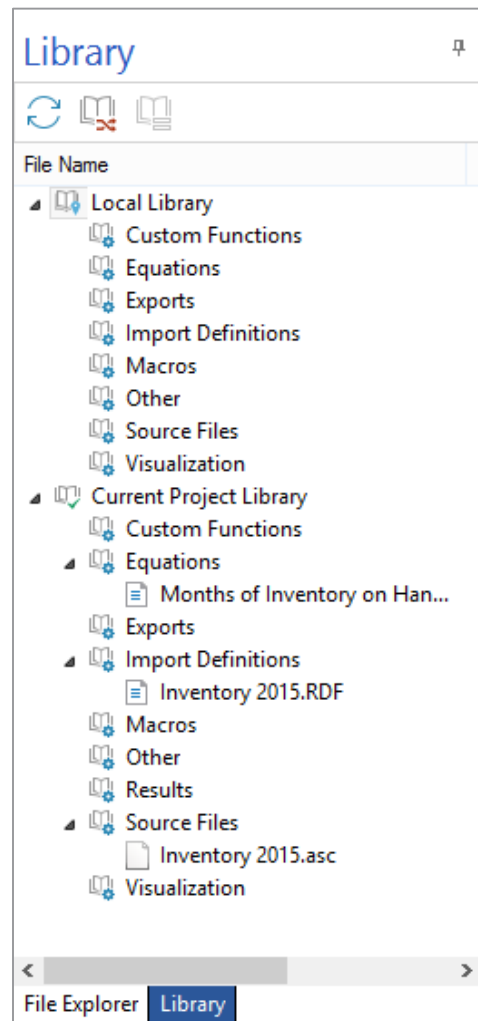
6. Click **Save**. All equations are save with the **.eqx** file name extension.
7. Click the **Validate and Exit** button, returning to the **Field Manipulation** dialog box.
8. Click **OK** and then **Yes** to append the field to the database.
9. View the resultant field by scrolling to the right of the display. The new field is added to the end (last field) of the database. Note the teal color of this field indicating that it is a calculated field and not an original imported field.

In discussion with the client, it becomes apparent that the shelf life of most **Bright IDEA's** products is only a few months and anything in excess of six months' use is likely to be obsolete

10. To view equations that have been saved IDEA keeps all the information in a library. You can access the library by clicking the **Library** tab at the bottom of the **File Explorer**



11. The **Library** tab contains a list of all the directories in which IDEA stores different type of information, such as equations, macros, exported documents, record definitions, custom functions, import definitions and source files. When the equation was saved it was saved automatically to the **Equations** folder under the **Current Project Library**:



12. If you wish to have any item in the **Current Project Library** available to all projects you can right click on the item and select **Copy to the Local Library**. You can also copy the item to another project in the same manner by copying to **Another Project**.

Generate Field Statistics

To produce the **Field Statistics** for the MONTHS field:

1. Click on the **Field Statistics** link in the **Properties** window.

A message dialog box appears that asks whether you want to create statistics for all fields without statistics.

2. Click **Yes**.

Field Statistics will be recalculated for all invalid or new fields. View the statistics for the **MONTHS** field.

3. Notice the **Average Value**, **Minimum Value**, and **Maximum Value**.

STATISTIC	VALUE	COMMENT
Average Value	9.13	
Minimum Value	-1.55	Negative Items
Maximum Value	737.14	

Note: The average may be misleading as it may be skewed by a few very high values of usage. Hence, it is often better to perform the Stratification task to profile the data. This is carried out in the next exercise.

4. Return to viewing the database by clicking on the **Data** link in the **Properties** window.

Stratify the Inventory into Bands

1. Ensure **Inventory at Dec 31 2015** is the active database and the **Data** link is selected in the **Properties** window.

2. From the **Analysis** tab, in the **Categorize** group, click **Stratification**.

The Stratification dialog box appears.

3. Select **MONTHS** in both the **Field to stratify** and **Fields to total on** list boxes.
 - Click on the **Increment** text box and enter **6** (6.00 will be displayed).
 - Click on the first row of the spreadsheet area – the **Lower Limit** box will automatically fill with the lowest value in the field to be stratified.
 - Double-click on the **Lower Limit** box in the first row; the value will be highlighted so you can type over it to change it. Change the value to **0** (0.00 will be displayed).
 - Click in the **Upper Limit** box on the first row of the spreadsheet area which will fill in your first increment.
 - Highlight the next 5 rows of the spreadsheet area and note how they fill with the increment, this should take the range up to 36.
4. Select the **Create database** option.
5. Select the **Include stratum intervals** option.
6. Change the File name to **Inventory Usage Aging**.

7. Click **Fields** and select only **PRODCODE**, **DEPOT**, **TOTALCOST**, and **MONTHS**.
To select or deselect a field, click the field name.
8. Click **OK** in the **Fields** dialog box.
9. Click **OK** in the **Stratification** dialog box.
10. Note the number of records in each stratum and also that there are **Upper limit exceptions**, i.e., items with greater than or equal to **36** months inventory in hand.
11. View the items with greater than or equal to **36** months inventory in hand by double-clicking over the **Upper limit exceptions** results and selecting **Display Records**.

Note that these items may be viewed, saved to a database, or printed. Once you have inspected the records, click **Done** to return to the **Results** output.
12. Create and print a report of the **Stratification Results**, including a graph.
13. On the **Stratification Results** output toolbar, click the **Chart Data** icon on the **Results** toolbar. Select **3D/2D** button on the chart toolbar.
14. If your computer is attached to a printer, click **Print** on the **Results** toolbar.
15. Return to viewing the **Stratification** analysis by clicking the **Chart Data** icon on the **Results** toolbar.
16. Return to viewing the database by clicking on the **Data** link of the **Properties** window.
17. Open the **Inventory Usage Aging** database created as part of this exercise. View this database and note the three additional fields added to the database (i.e., **STRATUM**, **STRAT_LOW**, **STRAT_HIGH**).

The last two fields were added as a result of checking **Include stratum intervals** on the **Stratification** dialog box.
18. Close all databases by clicking the **File** tab and then **Close All Databases**.

Conclusion

There are 611 (or 79.66) of the product lines that have less than 6 months usage. However, 4.43% (34 lines) have more than 3 years usage and these are a cause for concern.

There are also 3 items with negative usage, these should be identified and investigated.

Calculate the Total Provisions for Inventory by Depot

Objective:

- To provide an analysis of the total cost of the obsolete inventory.
- To identify old items for checking.
- To analyze the data by depot.

Exercise Description:

Total the value of obsolete inventory by depot. The Summarization task is used to provide totals of specified Numeric fields.

Additionally, this test will identify the number of obsolete inventory products as well as the total cost by depot.

IDEA Functionality Covered:

- How to summarize (i.e., total) data by a key
- The differences between the **Summarization** options

Discussion with the Chief Financial Officer on the results of the Stratification task indicate that items should have an obsolescence provision calculated on the following basis:

- 6-12 months: 50%
- Over 12 months usage in stock: 100%

The whole value of an item should be used for the provision calculation, not just the surplus over 6 or 12 months usage.

The following tests have been requested:

- Include the percentage provision for each age band
- Calculate the provision cost for each band for each depot
- Summarize to calculate the total provision for each depot

Include Provision in Database

1. Open and ensure that **Inventory Usage Aging** is selected as the active database.
2. Double-click over the Database window to load the **Field Manipulation** dialog box.
3. Click **Append** to add the following **Virtual** field:
 - **Field Name:** PROV_RATE
 - **Field Type:** Virtual numeric
 - **Field Length:** Do not enter
 - **Decimals:** 2
 - **Description:** Rate at which provision is to be calculated
4. Click in the **Parameter** box to load the **Equation Editor** and enter the following equation:
 @If(STRATUM <= 1, 0, @If(STRATUM = 2, 50, 100))

Note: STRATUM 0 is lower limit exceptions. **STRATUM 1** is less than 6 months. **STRATUM 2** is 6 to 12 months.

5. Click the **Validate and Exit** button, returning to the **Field Manipulation** dialog box.
6. Do not click **OK** on the **Field Manipulation** dialog box, as a further calculated field will be added in the next step.

Calculate the Provision (Value) by Product

1. Click **Append** to add the following **Virtual** field:
 - **Field Name:** PROV_AMT
 - **Field Type:** Virtual numeric
 - **Field Length:** Do not enter
 - **Decimals:** 2
 - **Description:** Provision Amount
2. Click in the **Parameter** cell to load the **Equation Editor** and enter the following equation:

$$\text{TOTALCOST} * \text{PROV_RATE} / 100.$$
3. Click the **Validate and Exit** button, returning to the **Field Manipulation** dialog box.
4. Click **OK** and then **Yes** to append the two fields to the database.
5. View the resultant fields by scrolling to the right of the display. The new fields are added to the end (last fields) of the database. Note that the data in both these fields is displayed in teal to distinguish them from original imported fields.

Calculate the Total Provision (Value) by Depot

Note: To summarize the database on more than one field in the key (i.e., by **STRATUM** within **DEPOT**) it is necessary to use the Summarization option.

1. Ensure **Inventory Usage Aging** is selected as the active database and the **Data** property is selected in the **Properties** window.
2. From the **Analysis** tab, in the **Categorize** group, click **Summarization**.
3. In the **Fields to summarize** area, select **DEPOT** and **STRATUM**.
4. Note that no fields are selected in the **Numeric fields to total** area. Select the **TOTALCOST** and **PROV_AMT** fields to total these amounts in the summarized file.
5. Select the **Create database** option, but do not select the **Create result** option.
6. Leave the **Criteria** box empty.
7. In the **File name** field, enter **Proposed Provision by Depot**.
8. Click **OK**.

9. View the resultant database and note the following fields:

- **Depot:** List of depots
- **Stratum:** Age band (months)
- **No_of_RECS:** Number of records band
- **TOTALCOST_SUM:** Cost of inventory per depot/age band
- **PROV_AMT_SUM:** Total provision per depot/age band

Notice that the **NO_OF_RECS** field is blue and underlined. This denotes an **Action Field**. Click the blue values to see the underlying records.

There are 4 depots listed in this database. London is not an approved depot. These records should be investigated.

10. Flag this database to indicate that it contains significant findings. Currently, it is situated two levels down in the tree view. To flag a file, highlight the database name to be flagged in the **File Explorer** and click the **Flag File** button on the **File Explorer** toolbar. The **File Explorer** may need to be resized in order to access the button. Alternatively, you can right-click on the database name in the **File Explorer** and select **Flag file**.

After the database is flagged, it will have a new icon and will be moved up in the tree hierarchy.

11. To remove the flag from a file, highlight the database name in the **File Explorer** window and click on the **Flag File** button again. Alternatively, you can right-click on the database name in the **File Explorer** and select **Flag file** again.

12. A report of the proposed obsolescence provision should now be created. Produce a report of the results with subtotals for each depot.

13. From the **File** tab, click **Print** and then **Create Report**. The **Report Assistant** will be displayed. Accept all options on the first step dialog box to create a horizontal report. Click **Next**.

14. **The Report Assistant – Headings** step.

- i. Modify the following field names by highlighting the field name in the list box on the left and typing your changes in the **Text** box on the bottom right.
- ii. TOTALCOST_SUM **modify to** TOTAL COST.
- iii. PROV_AMT_SUM **modify to** PROVISION AMOUNT
- iv. Click **Next**.

15. **Report Assistant – Define Breaks** step.

- i. Enter the report breaks index as shown below:
 - **DEPOT:** Ascending
 - **STRATUM:** Ascending
- ii. Click **Next**.

16. **Report Assistant – Report Breaks** step.
 - i. Enter or select the following options:
 - **Break Key field:** DEPOT
 - **Fields to Total:** NO_OF_RECS, TOTALCOST_SUM, PROV_AMT_SUM
 - ii. Specify a break spacing of 3 lines.
 - iii. Click **Next**.
17. **Report Assistant – Grand Totals** step.
 - i. In the Fields to Total list box, select the following fields:
 - NO_OF_RECS
 - TOTALCOST_SUM
 - PROV_AMT_SUM
 - ii. Click **Next**.
18. **Report Assistant – Header/Footer** step.
 - i. Do not print a cover page.
 - ii. Click **Finish**. When prompted, preview the report created.
 - iii. Click **Yes**. Zoom and navigate through the report.
19. Print the report by clicking on the **Print** button on the *Preview Window*.
20. Click **OK** to print the report.
21. Close all databases by clicking the **File** tab and then **Close All Databases**.

Note: Summarization is often used to produce a list of expected unique items for verification (e.g., depots in this exercise), as well as producing totals for selected Numeric fields.

Another way to display the proposed provisions by depot is to create a **Pivot Table**. **Pivot Tables** have been used in spreadsheet software for a long time. **Pivot Tables** can be created easily in IDEA. The created **Pivot Table** becomes a **Results** Output in the source database.

Create a **Pivot Table** to summarize provision and total cost amounts by depot.

1. Open the **Inventory Usage Aging** database.
2. From the **Analysis** tab, in the **Categorize** group, click **Pivot Table**.
3. A prompt will require labeling the **Pivot Table** results. Enter **Inventory Usage Pivot Table** and then click **OK**.
An empty **Pivot Table** framework appears.
4. From the **Pivot Table Field List** dialog box, highlight the **DEPOT** field name and drag it to the **Drop Column Fields Here** area.
5. Highlight the **STRATUM** field name from the **Pivot Table Field List** dialog box and drag it to the **Drop Row Fields Here** area.
6. Highlight the **PROV_AMT** field from the **Pivot Table Field List** dialog box and drag it to the **Drop Data Items Here** area

7. Highlight the **TOTALCOST** field name and drag it to the **Drop Data Items Here** area to finish the **Pivot Table**.
8. Close the **Pivot Table Field List**.
9. Print the **Pivot Table** by clicking the **Print** button on the **Pivot Table** toolbar.

Note: This exercise illustrates the interactive mode of using IDEA, i.e., the results of one test highlights problems and leads to further tests being carried out.

Conclusion

The client's provision for obsolete items of \$9,360 is clearly inadequate as the Chief Financial Officer suspected. A figure of approximately \$150,000 is more appropriate. In addition, the client may want to take action to dispose of excess inventories. Additional reports of high value items, or particularly old items by depot, may be useful to the client but are not part of this tutorial.

Test the Accuracy of the Automatic Reordering System

Objective:

To test the accuracy of the ordering system.

Exercise Description:

A new automatic re-ordering system has been implemented. However, it has been noted that orders are being lost due to unavailability of the required inventory.

The automatic re-ordering system has maximum and minimum ordering levels. However, these limits can be manually over-ridden. The level of obsolete inventory and unavailability of inventory point to the fact that either the limits require review or ordering levels are being incorrectly altered.

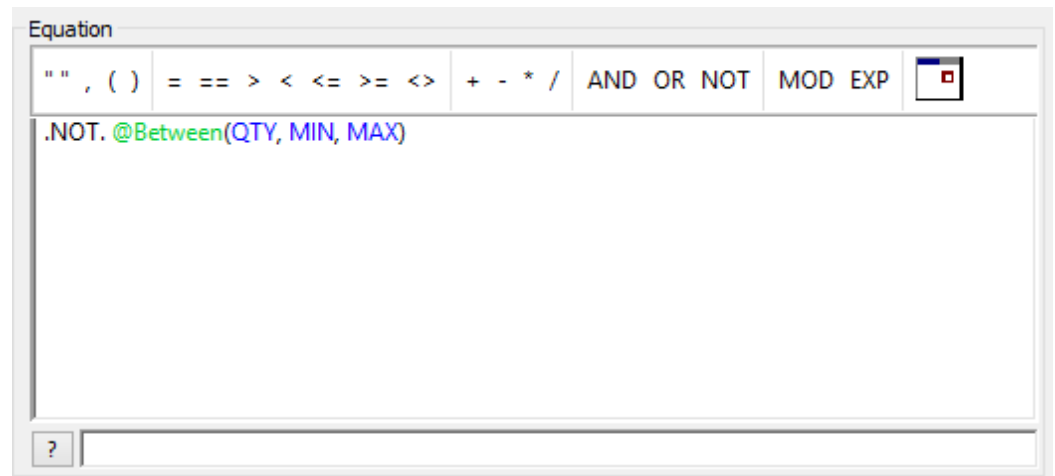
IDEA Functionality Covered:

- Use the **@Between** function
 - Index a Database
1. Open and ensure the **Inventory at Dec 31 2015** database is selected as the active database.
 2. From the **Analysis** tab, in the **Extract** group, click **Direct**.
 3. Change the file name to **Re-Order Level Errors**.
 4. To enter the equation, click the **Equation Editor** button. The **Equation Editor** will appear and is used to enter the required equation.

5. Enter the expression: **.NOT. @Between(QTY , MIN , MAX)** as follows:
- Click the **NOT** button.
 - In the **Functions** box, expand the **Matching** category.
 - Locate and double-click the function name **@Between**.
 - Double-click the **QTY** field from the lower portion of the **Equation Editor** dialog box.
 - Type a comma.
 - Double-click the **MIN** field from the lower portion of the **Equation Editor** dialog box.
 - Type a comma.
 - Double-click the **MAX** field from the lower portion of the **Equation Editor** dialog box.

Note: The **@Between()** function will be used to test for quantities outside the minimum and maximum order limits.

The **@Between** function has three parameters. The first is the field being tested. The second is a low limit for that field and the third is a high limit. **@Between** selects those items that are between the two limits. It is quite common to use **@Between** preceded with **.NOT.** to identify items that are outside the set limits.



6. Once the equation has been entered, check the syntax by clicking the **Validate** button. If a syntax error occurs in your equation, correct the expression and recheck the syntax. The equation should be as in the above screen. Click the **Validate and Exit** button.

Direct Extraction

Records to extract: ☒ All ☐ Range ☐ Create a virtual database

Starting record #: 1

Ending record #: 767

Database order: No index

	File Name	Criteria
1	Re-Order Level Errors	.NOT. @Between(QTY, MIN, MAX)
2		

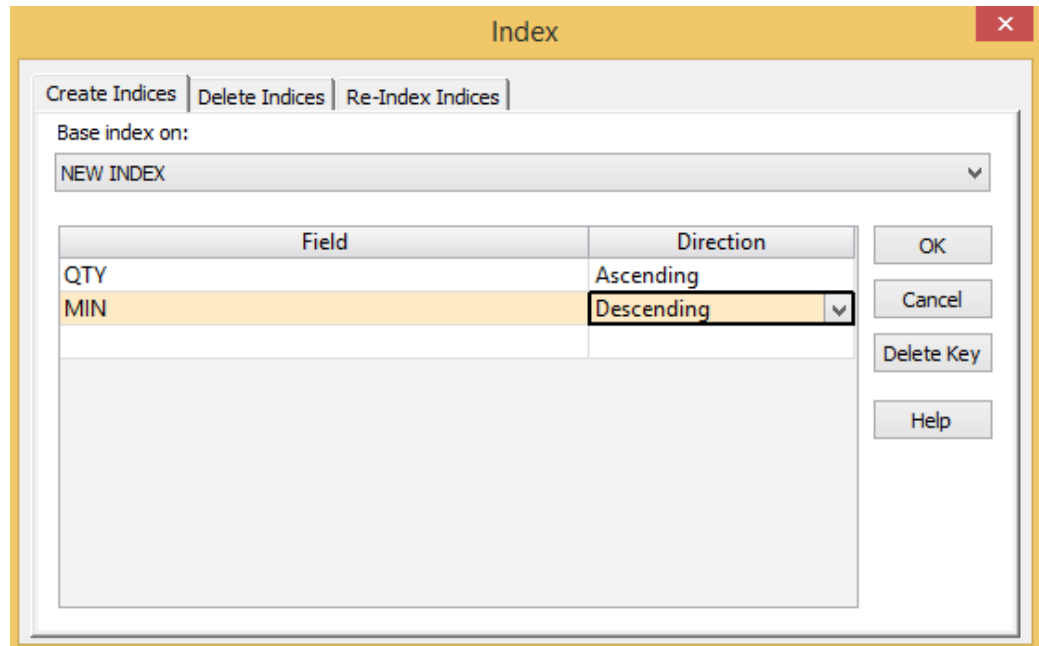
Buttons: OK, Create Fields, Fields, Delete, Cancel, Help

7. Click **OK** to run the extraction.

The resultant database will be created and the **Re-Order Level Errors** database will be displayed. It should contain **314** items with a total cost of **\$378,182.783**.

This level of items outside the re-order levels confirms serious problems. There are too many items to investigate so we will prioritize by indexing.

8. Sequence the data into the most suitable order for follow-up.
9. From the **Data** tab, in the **Order** group, click **Index**.
10. Choose the following sequence:
 - **QTY**: Ascending
 - **MIN**: Descending



11. Click **OK** to create the index.
 The data is sequenced with the lowest quantity items with the highest minimum re-order level at the top for investigation.
 Briefly inspect the report. This will be given to the client for them to investigate.
12. Click **Close** by right-clicking on the **Re-Order Level Errors** database tab.

Analyze Selling Prices and Margins

Objectives:

To identify items with inappropriate profit margins.

Exercise Description:

- Identify items where no current selling price has been entered
- Analyze the variance in selling price over the year and identify unusually large or small changes
- Analyze profit margins and extract negative or small margins

IDEA Functionality Covered:

- Utilize the **Criteria** option rather than **Direct Extraction** to identify items
- **@If**
- **Stratification**

Identify Items Where No Selling Price Has Been Entered

1. Open the **Inventory at Dec 31 2015** database.

In this exercise, the **Criteria** property in the **Properties** window will be used instead of performing a **Direct Extraction** to identify the items.

This option is similar to the **Direct Extraction** option. It is used to identify records satisfying a given equation but it does not create a database.

2. Click the **Criteria** link in the **Properties** window to load the **Equation Editor**.
3. Enter the following equation to identify a missing current selling price:
CURSELLPRI = 0.
4. Click the **Validate and Exit** button in the **Equation Editor** to complete the equation.
5. The **Equation Editor** is closed returning to the database with the criterion applied.

Inventory at Dec 31 2015:IMD												Properties	
	PRODCODE	DEPOT	QTY	AV_COST	TOTALCOST	OBSOLETE	MAX	MIN	DELOTY	ORDERNO	DE	Database	
1	421143307	TORONTO	1	24.102	24.102	Y	10	0	12	760327	9/15	✓ Data	
												History	
												Field Statistics	
												Control Total:	
												24,102	
												(TOTALCOST)	
												Criteria:	
												CURSELLPRI = 0	

Note the number of records selected (i.e., **1/767**) on the bottom right of the screen. This indicates that there is one item with no selling price in a database of 767 items.

Note also that this item has a quantity in inventory. The cost of this item is **\$24.102** as can be seen near the **Control Total** link in the **Properties** window.

6. Right-click the **Criteria** link and select **Clear** to remove the criterion.

Analyze Selling Price Movements

We decide to test whether prices are being increased or decreased and look for trends. We first calculate the percentage price movement and then perform an analysis.

1. Ensure **Inventory at Dec 31 2015** is selected as the active database and the **Data** property is selected in the **Properties** window.
2. Double-click over the Database window to load the **Field Manipulation** dialog box.
3. Click **Append** to add the following **Virtual** field:
 - **Field Name:** PRICE_MOV
 - **Field Type:** Virtual numeric
 - **Field Length:** Do not enter
 - **Decimals:** 2
 - **Description:** Price Movement
4. Click in the **Parameter** text box to load the **Equation Editor** and enter the following equation:

$$\text{@If (PREVSELLPRI = 0, 100, (CURSELLPRI - PREVSELLPRI)*100 / PREVSELLPRI)}$$
5. Click the **Validate and Exit** button, returning to the **Field Manipulation** dialog.
6. Click **OK** and then **Yes** to append the **PRICE_MOV** field to the database.
7. Click the **Field Statistics** link in the **Properties** window.

8. Calculate the statistics when prompted.

Inventory at Dec 31 2015.IMD x		
Field Type	Numeric Statistics	
Numeric	Net Value	34,391.30
Date	Absolute Value	36,924.84
Time	# of Records	767
Numeric Fields		
☐ PRODCODE	# of Zero Items	0
☐ QTY	Positive Value	35,658.07
☐ AV_COST	Negative Value	-1,266.77
☐ TOTALCOST	# of Positive Records	698
☐ MAX	# of Negative Records	69
☐ MIN	# of Data Errors	0
☐ DELQTY	# of Valid Values	767
☐ ORDERNO	Average Value	44.84
☐ CURSELLPRI	Minimum Value	-53.00
☐ PREVSELLPRI	Maximum Value	11,375.00
☐ USAGE	Record # of Min	210
☐ PREVCOST	Record # of Max	147
☐ MONTHS	Sample Std Dev	411.73
☒ PRICE_MOV	Sample Variance	169,522.95
	Pop Std Dev	411.46
	Pop Variance	169,301.93
	Pop Skewness	27.221786
	Pop Kurtosis	746.592635

Record the Minimum, Maximum and Average values for the PRICE_MOV field.

STATISTIC	VALUE	COMMENT
Minimum	-53.00	At least one item has had major price cuts
Maximum	11,375.00	This is likely to be the correction for an error
Average	44.84	Client feels this is rather high

Again the average figure is skewed so we should prepare a profile.

9. Return to the database by clicking on the **Data** link in the **Properties** window.
10. Stratify the **PRICE_MOV** into bands as follows:
11. From the **Analysis** tab, in the **Categorize** group, click **Stratification**.
12. In the **Field to stratify** list box, select **PRICE_MOV**.
13. In the **Fields to total on**, select **PRICE_MOV**.
14. In the **Increment** box, delete the default value and enter **10**.
15. Enter the following stratification bands:

>=LOWER LIMIT	< UPPER LIMIT
(50.00)	(40.00)
(40.00)	(30.00)
(30.00)	(20.00)
(20.00)	(10.00)
(10.00)	0.00
0.00	10.00
10.00	20.00
20.00	30.00
30.00	40.00
40.00	50.00

16. Do not select the **Create Database** box.

17. In the **Result name** box, enter **Price Move Stratification**.

Stratification

Group by: don't group

Increment: 10.00

Field to stratify:

ORDERNO

DELDATED

CURSELLPRI

CUREFFDATE

PREVSELLPRI

USAGE

PREVCOST

MONTHS

PRICE_MOV

Fields to total on:

☐ DELQTY

☐ ORDERNO

☐ CURSELLPRI

☐ PREVSELLPRI

☐ USAGE

☐ PREVCOST

☐ MONTHS

☒ PRICE_MOV

Criteria:

☐ Create database

☐ Include stratum intervals

☐ Create a virtual database

☒ Create result

File name: Stratification

Result name: Price Move Stratification

	>= Lower Limit	< Upper Limit
1	(50.00)	(40.00)
2	(40.00)	(30.00)
3	(30.00)	(20.00)
4	(20.00)	(10.00)
5	(10.00)	0.00
6	0.00	10.00
7	10.00	20.00
8	20.00	30.00
9	30.00	40.00
10	40.00	50.00
11		
12		
13		
14		
15		

OK

Cut off

Fields

Insert

Remove

Cancel

Help

18. Click **OK** to perform the Stratification.

19. View the **Price Move Stratification Results** output.

Inventory at Dec 31 2015.IMD							
Totalled on: PRICE_MOV							
Stratum #	>= L Limit	< U Limit	# Records	(%) # Records	PRICE_MOV	(%) PRICE_MOV	
1	-50.00	-40.00	4	0.52	-195.21	-0.57	
2	-40.00	-30.00	2	0.26	-66.83	-0.19	
3	-30.00	-20.00	6	0.78	-137.05	-0.40	
4	-20.00	-10.00	23	3.00	-300.28	-0.87	
5	-10.00	0.00	26	3.39	-162.18	-0.47	
6	0.00	10.00	239	31.16	1,551.20	4.51	
7	10.00	20.00	236	30.77	2,920.28	8.49	
8	20.00	30.00	23	3.00	515.77	1.50	
9	30.00	40.00	5	0.65	159.55	0.46	
10	40.00	50.00	2	0.26	83.01	0.24	
		Lower limit exceptions:	8	1.04	-405.22	-1.18	
		Upper limit exceptions:	193	25.16	30,428.26	88.48	
		Totals:	767	100.00	34,391.30	100.00	

The majority of items have had price increases in the range **0 - 20%**.

The **193** items in excess of 50% (i.e., the Upper limit exceptions) and those below 50%, require further investigation.

20. Return to the **Data** link of the **Inventory at Dec 31 2015** database.
21. Extract any high variances, excluding new items into a database named **Major Price Movements**. Enter the following extraction equation using the **Equation Editor**:
- @Abs(PRICE_MOV) > 50 .AND. PREVSELLPRI <> 0
22. Run the extraction.
- Note:** @Abs(PRICE_MOV) > 50 identifies increases and decreases > 50%. PREVSELLPRI <> 0 excludes new items.
- There should be **15** items of which **7** have usage.
23. Close the **Major Price Movements** database.

Conclusion

Most items have had modest price increases. Items should be referred to the client to ensure the prices are correct.

Analyze Profit Margins

1. Ensure **Inventory at Dec 31 2015** is selected as the active database and the **Data** property is selected in the **Properties** window.
2. Double-click over the Database window to load the **Field Manipulation** dialog box.
3. Click **Append** to add the following **Virtual** field:
 - **Field Name:** PROFIT
 - **Field Type:** Virtual numeric
 - **Field Length:** Do not enter
 - **Decimals:** 2
 - **Description:** % Profit
4. Click in the **Parameter** cell to load the **Equation Editor** and enter the following equation:

$$\text{@If (CURSELLPRI} = 0, 0, (\text{CURSELLPRI} - \text{AV_COST}) * 100 / \text{CURSELLPRI})$$
 to calculate profit as a percentage of price.
5. Click the **Validate and Exit** button, returning to the **Field Manipulation** dialog box.
6. Click **OK** on the **Field Manipulation** dialog to append the **PROFIT** field to the database.
7. Click the **Field Statistics** link in the **Properties** window.
8. When prompted, click **Yes** to create statistics.

Field: PROFIT

STATISTIC	VALUE	COMMENT
Minimum	-28.33	Loss leaders
Maximum	100.00	
Average	56.27	Client considers this correct

The average is meaningful here. However items with negative margins should be extracted. It is often expected that low volume items should have a high margin and high volume items should have a lower margin.

9. Return to the **Data** property of the **Inventory at Dec 31 2015** database.
10. From the **Analysis** tab, in the **Extract** group, click **Direct**.
11. Enter **File Name: Negative Profit Items**.
12. Click the **Equation Editor** button and enter the equation: **PROFIT < 0**.
13. Click the **Validate and Exit** button on the **Equation Editor**.
14. Click **OK** to extract the items satisfying the equation.
 Notice that the three items identified have no quantity or usage so they have not caused the client any problems, but the client should still be informed.
15. Close the **Negative Profit Items** database.

In order to analyze profit margins by the volume of sales we need the sales information. This is not available on the file but taking the annual usage figure and multiplying by the current selling price can make an approximation.

1. Ensure **Inventory at Dec 31 2015** is the active database and the **Data** property is selected in the **Properties** window.
2. Double-click over the database to load the **Field Manipulation** dialog and click the **Append** button to add the following **Virtual** field:
 - **Field Name:** SALES
 - **Field Type:** Virtual numeric
 - **Field Length:** Do not enter
 - **Decimals:** 0
 - **Description:** Estimate of Sales
3. Click in the **Parameter** cell to load the **Equation Editor** and enter the formula:
USAGE * CURSELLPRI
4. Click the **Validate and Exit** button to accept the equation.
5. Click **OK** then **Yes** to append the **Virtual** field.
6. Analyze the items in turnover bands by clicking **Stratification** from the **Categorize** group on the **Analysis** tab.
7. In **Field to stratify** list box, select **SALES**.
8. In the **Fields to total on** list box, select **SALES**.
9. Enter the following stratification bands:

>= LOWER LIMIT	< UPPER LIMIT
0	10,000
10,000	100,000
100,000	1,000,000

10. Select the **Create Database** option and enter the File name: **Inventory with Turnover Band**.
11. Click **OK** to perform the Stratification.
12. Analyze the items in turnover bands by clicking **Stratification** from the **Categorize** group on the **Analysis** tab.
13. In the **Group by** drop-down list, select **STRATUM**.
14. In the **Field to stratify** list box, select **PROFIT**.
15. In the **Fields to total on** list box, select **PROFIT**.

16. Enter the following stratification bands:

>= LOWER LIMIT	< UPPER LIMIT
(50,00)	0.00
0.00	10.00
10.00	20.00
20.00	30.00
30.00	40.00
40.00	50.00
50.00	75.00
75.00	100.00

17. In the **Result name** box, enter **Profit Stratification**.
18. Click the **OK** button to perform the Stratification.
19. View the stratification report for the first key (i.e., **Stratum 1**) in the **Profit Stratification** output of the **Database** window.
20. In the **STRATUM=** list box, select each stratum in turn and view the Stratification Reports to view a separate stratification of profitability for each strata of turnover.
21. Close all databases by clicking the **File** tab and then **Close All Databases**.

Audit Findings The following findings should be reported to the client:

- About 13% of the product lines have excessive quantities on stock and a provision of about \$150,000 is suggested.
- The re-ordering system is not working correctly and items have been identified for investigation.
- Price increases and profit margins are, on the whole, reasonable but exceptional items have been identified for follow-up