TableToLongForm

Literate Program

Jimmy Oh

Department of Statistics
University of Auckland

Corresponds to R Package Version 1.3.1 (pre-release)

Abstract

TableToLongForm automatically converts hierarchical Tables intended for a human reader into a simple LongForm Dataframe that is machine readable. It does this by recognising positional cues present in the hierarchical Table (which would normally be interpreted visually by the human brain) to decompose, then reconstruct the data into a LongForm Dataframe. This is the Literate Program for TableToLongForm and contains the entirety of the code with accompanying documentation.

Contents

On Literate Programs

This software is presented as a *literate program* written in the *noweb* format (Ramsey 1994). It serves as both the documentation and container of the literate program. The `noweb` file can be used to produce both the *literate document* and the executable code.

The literate document is separated into *documentation chunks* and named *code chunks*. Each *code chunk* can contain code directly, or contain references to other *code chunks* which act as placeholders for the contents of the respective *code chunk*. The name of each *code chunk* should serve as a short description of the code it contains. Thus each *code chunk* provides an overview of its purpose by either directly containing code, or by containing the names of other *code chunks*. The reader is then free to delve deeper into the respective *code chunks* if desired.

1 Introduction

This Literate Document delves deeply into the source code for TableToLongForm. Most users will probably find the Home Page for TableToLongForm[1] more informative.

The Literate Program is a constant work-in-progress, and some of the sections may have out of date documentation, or be lacking in documentation completely.

[1] `https://www.stat.auckland.ac.nz/~joh024/Research/TableToLongForm/`

2 Code Overview

Unless the Table is horrible beyond mortal imagination, it should have some kind of pattern, such that a human will be able to discern the structure and hence understand the data it represents. This code attempts to algorithmically search for such patterns, discern the structure, then reconstruct the data into a LongForm Dataframe.

The task can be seen to consist of three phases:

- Phase One is Identification, which involves identifying the rows and columns where the labels and the data can be found.
- Phase Two is Discerning the Parentage, which involves identifying the hierarchical structure of the data, based on the row and column labels.
- Phase Three is Reconstruction, where we use what we've found in the first two phases to reconstruct the data into a LongForm Dataframe.

3a ⟨*TableToLongForm.R* 3a⟩≡

⟨*document header* 3b⟩
⟨*Front End* 4a⟩
⟨*Back End* 5b⟩
⟨*Identification* 9a⟩
⟨*Discern Parentage* 15a⟩
⟨*Reconstruction* 25a⟩

This code is written to file `TableToLongForm.R`.

We place a document header at the top of the extracted code to encourage people to read the literate description rather than attempting to study the code alone.

3b ⟨*document header* 3b⟩≡

```
##-----------------------------------------------------------------------
## The code in this .R file is machine generated from the literate
##  program, TableToLongForm.Rnw
## Documentation can be found in the literate description for this
##  program, TableToLongForm.pdf
##-----------------------------------------------------------------------
```

2.1 Front End

The main function `TableToLongForm` is defined here. For most users this is the only function they will call. The arguments are as follows:

Table the Table to convert, given as a `character matrix`. Also accepts a `data.frame`, which is coerced to a `matrix` with a warning.

IdentResult an optional `list` specifying the locations of the various elements of the `Table`. By default this is automatically generated but it can be specified manually where the automatic detection fails.

IdentPrimary, IdentAuxiliary, ParePreRow, ParePreCol specify the algorithms TableToLongForm should use. Refer to the respective sections for more details.

fulloutput if `TRUE`, returns a `list` containing additional information primarily useful for diagnostic purposes. Otherwise, and by default, the function only returns the converted `data.frame` object.

diagnostics a `character vector` specifying the name of the file diagnostic output will be written to. Can also be `TRUE`, in which case the file name will be the name of the object specified in `Table`.

diagnostics.trim a `logical` indicating whether the diagnostics output should be trimmed. A good idea to keep `TRUE` (default) as trimmed output is generally more useful.

This function handles some busy-work, such as coercing the `Table` to a `matrix` (with a warning) and setting up the diagnostics output file. It then calls `ReconsMain` which handles the real meat of the conversion.

In the package version of TableToLongForm, this, and some back-end functions, are the only functions that are exported, the rest are hidden in the package namespace (which is still accessible, just not as easily). If sourcing in the raw .R file, the majority of the supporting functions are not hidden and can be accessed directly from the Global Environment.

4a ⟨*Front End* 4a⟩≡

```
TableToLongForm =
  function(Table, IdentResult = NULL,
           IdentPrimary = "combound",
           IdentAuxiliary = "sequence",
           ParePreRow = NULL,
           ParePreCol = c("mismatch", "misalign", "multirow"),
           fulloutput = FALSE,
           diagnostics = FALSE, diagnostics.trim = TRUE){
    ⟨Check Table arg 4b⟩
    ⟨Setup diagnostics file 5a⟩
    fullout = ReconsMain(matFull = Table, IdentResult,
      IdentPrimary, IdentAuxiliary, ParePreRow, ParePreCol)
    if(fulloutput) fullout else fullout$datafr
  }
```

Uses `IdentResult` 26a and `ReconsMain` 25b.

4b ⟨*Check Table arg* 4b⟩≡

```
if(is.data.frame(Table)){
  warning("Table supplied is a data.frame.\n",
          "TableToLongForm is designed for a character matrix.\n",
          "The data.frame is being coerced to a matrix but this\n",
          "may lead to unexpected results.",
          immediate. = TRUE)
  Table = as.matrix(Table)
}
if(!is.matrix(Table))
  stop("Table argument must be a matrix or a data.frame")
```

5a ⟨*Setup diagnostics file* 5a⟩≡

```
if(diagnostics != FALSE){
  if(!is.character(diagnostics))
    diagnostics = deparse(substitute(Table))
  assign("TCRunout", file(paste0(diagnostics, ".TCRunout"), "w"),
         envir = TTLFBaseEnv)
  assign("TCtrim", diagnostics.trim, envir = TTLFBaseEnv)
  on.exit({
    with(TTLFBaseEnv, {
      close(TCRunout)
      rm(TCRunout)
      rm(TCtrim)
    })
  })
}
```

Uses `TTLFBaseEnv` 7.

2.2 Back End

Various code, mainly to help produce diagnostic output, can be ignored by most users.

5b ⟨*Back End* 5b⟩≡

⟨*BErbinddf* 5c⟩
⟨*BEprintplist* 6a⟩
⟨*BEattrLoc* 6b⟩
⟨*BETCRsink* 7⟩
⟨*BETTLFalias* 8⟩

rbinddf An `rbind` method to handle data.frames with differing column names. Does not check if arguments are actually data.frames, so can break easily.

5c ⟨*BErbinddf* 5c⟩≡

```
rbinddf =
  function(..., deparse.level = 0){
    bindlist = list(...)
    nameunion = NULL
    for(j in 1:length(bindlist))
      nameunion = union(nameunion, colnames(bindlist[[j]]))
    for(j in 1:length(bindlist)){
      curdf = bindlist[[j]]
      namediff = setdiff(nameunion, colnames(curdf))
      matdummy = matrix(NA, nrow = nrow(curdf), ncol = length(namediff),
        dimnames = list(NULL, namediff))
      bindlist[[j]] = cbind(curdf, matdummy)
    }
    outdf = do.call(rbind,
      c(bindlist, list(deparse.level = deparse.level)))
    for(j in 1:ncol(outdf))
      if(mode(outdf[,j]) == "character") outdf[,j] = factor(outdf[,j])
    outdf
  }
```

Defines:
`rbinddf`, used in chunk 30a.

print.plist A print method for class `plist`, which are nested lists with a numeric vector at the lowest level; `print.default` is rather inefficient in displaying such nested lists.

6a ⟨*BEprintplist* 6a⟩≡

```
print.plist =
  function(x, ...){
    plistC = function(plist){
      pLoc = attr(plist, "Loc")
      if(is.list(plist)){
        namevec = names(plist)
        if(!is.null(pLoc))
          namevec = paste0(names(plist),
            " (", pLoc[,"rows"], ", ", pLoc[,"cols"], ")")
        namelist = as.list(namevec)
        for(i in 1:length(namelist))
          namelist[[i]] =
            c(paste("+", namelist[[i]]),
              paste("-", plistC(plist[[i]])))
        do.call(c, namelist)
      } else{
        if(!is.null(names(plist))){
          namevec = names(plist)
          if(!is.null(pLoc))
            namevec = paste0(names(plist),
              " (", plist, ", ", pLoc[,"cols"], ")")
          paste("+", namevec)
        } else paste(plist, collapse = " ")
      }
    }

    cat(plistC(x), sep = "\n")
  }
```

attrLoc A function for creating a `plist` object and binding location information (rows and cols) to it.

6b ⟨*BEattrLoc* 6b⟩≡

```
attrLoc =
  function(plist, rows = NULL, cols = NULL){
    attr(plist, "Loc") = cbind(rows, cols)
    class(plist) = "plist"
    plist
  }
```

Defines:
`attrLoc`, used in chunks 20 and 22–24.

TCRsink Sinks the output to `TCRunout` for diagnostic output. Requires the existence of `TCRunout` which is created by the main function `TableToLongForm` when `diagnostics = TRUE`.

Spaces may be introduced by `match.call`, thus any spaces in the args of *variables to sink* (that is, the arguments supplied via `...`) are removed without warning.

We also create the `TTLFBaseEnv` here, which is currently only used to temporarily store `TCRunout`.

7 ⟨*BETCRsink* 7⟩≡

```
TCRsink =
  function(ID, ...)
  if(exists("TCRunout", envir = TTLFBaseEnv)){
    varlist = list(...)
    names(varlist) = gsub(" ", "", as.character(match.call()[-(1:2)]))
    TCtrim = get("TCtrim", envir = TTLFBaseEnv)
    with(TTLFBaseEnv, sink(TCRunout))
    for(i in 1:length(varlist)){
      cat("###TCR", ID, names(varlist)[i], "\n")
      curvar = varlist[[i]]
      if(TCtrim == TRUE){
        curvar = head(curvar)
        if(is.matrix(curvar) || is.matrix(curvar))
          if(ncol(curvar) > 6)
            curvar = curvar[,1:6]
      }
      print(curvar)
    }
    sink()
  }
TTLFBaseEnv = new.env()
```

Defines:

`TCRsink`, used in chunks 10, 16–18, 20, 22–24, 26b, 27, and 30b.
`TTLFBaseEnv`, used in chunks 5a and 8.

TTLFalias Used for the new Modular System. Check "Working with Modules" documentation available from the main website.

Should add a check to aliasAdd for existing rows with same alias (and same Type, probably ok to allow same alias for different Types).

8 ⟨*BETTLFalias* 8⟩≡

```
with(TTLFBaseEnv, {aliasmat = NULL})
TTLFaliasAdd =
  function(Type, Fname, Falias, Author = "", Description = "")
  assign("aliasmat",
         rbind(get("aliasmat", envir = TTLFBaseEnv),
               c(Type = Type, Name = Fname, Alias = Falias,
                 Author = Author, Description = Description)),
         envir = TTLFBaseEnv)

TTLFaliasGet =
  function(Type, Falias){
    aliasmat = get("aliasmat", envir = TTLFBaseEnv)
    matchRow = which(aliasmat[,"Type"] == Type &
      aliasmat[,"Alias"] == Falias)
    if(length(matchRow) == 1)
      aliasmat[matchRow,"Name"]
    else stop("Invalid algorithm specified for ", Type)
  }

TTLFaliasList =
  function(){
    aliasmat = get("aliasmat", envir = TTLFBaseEnv)
    Types = unique(aliasmat[,"Type"])
    for(Type in Types){
      cat("==Type: ", Type, "==\n", sep = "")
      Algos = aliasmat[aliasmat[,"Type"] == Type,,drop=FALSE]
      for(i in 1:nrow(Algos))
        cat("Name: ", Algos[i, "Name"], "\n",
            "Alias: ", Algos[i, "Alias"], "\n",
            "Author: ", Algos[i, "Author"], "\n",
            "Description: ", Algos[i, "Description"], "\n\n",
            sep = "")
    }
  }
```

Defines:
`TTLFaliasAdd`, used in chunks 9c, 12a, 16, and 18.
`TTLFaliasGet`, used in chunks 26 and 27.
Uses `TTLFBaseEnv` 7.

3 Identification

The purpose of **Identification** is to identify where in the Table the data is found and where the accompanying labels are, while ignoring any extraneous information we do not want. The output is the `IdentResult`, a list containing two elements, `rows` and `cols`, each of which is a list containing these two elements:

label - a vector of the rows or columns where the labels are found.

data - a vector of the rows or columns where the data are found.

It is intended for this procedure to involve a number of Identification algorithms that are used for a high degree of reliability and flexibility, but at this stage there is only a single Primary algorithm, supplemented by a single Auxiliary algorithm.

We separate the Identification functions into three groups.

Ident Primary contain Primary Ident algorithms, of which one is chosen when calling `TableToLongForm`.

Ident Auxiliary contain Auxiliary Ident algorithms, of which any combination, in any order, can be chosen when calling `TableToLongForm`. They are called after the Primary algorithm, to refine the `IdentResult`.

Ident Support contains supporting functions called by the Primary and Auxiliary functions.

9a ⟨*Identification* 9a⟩≡
⟨*Ident Primary* 9b⟩
⟨*Ident Auxiliary* 11b⟩
⟨*Ident Support* 12d⟩

3.1 Identification - Primary

The Primary Ident algorithms should take a single argument, `matFull`. They should return an `IdentResult`.

9b ⟨*Ident Primary* 9b⟩≡
⟨*Ident by Most Common Boundary* 9c⟩

3.1.1 Ident by Most Common Boundary

Search for the most common start and end rows and columns (the boundary) to find a block (rectangular region) of numbers, which is assumed to be our table of data.

9c ⟨*Ident by Most Common Boundary* 9c⟩≡

```
IdentbyMostCommonBoundary =
  function(matFull){
    ⟨Get Non empty rows and cols 9d⟩
    ⟨Call Ident MostCommonBoundary 10a⟩
    ⟨Construct rowslist and colslist 10b⟩
    ⟨Cleanup MostCommonBoundary Results 11a⟩
    list(rows = rowslist, cols = colslist)
  }
TTLFaliasAdd("IdentPrimary", "IdentbyMostCommonBoundary", "combound",
             "Base Algorithm", "Default IdentPrimary algorithm")
```

Uses `TTLFaliasAdd` 8.

9d ⟨*Get Non empty rows and cols* 9d⟩≡

```
rowNonempty = (1:nrow(matFull))[IdentNonEmpty(matFull, 1)]
colNonempty = (1:ncol(matFull))[IdentNonEmpty(matFull, 2)]
```

Uses `IdentNonEmpty` 13a.

10a ⟨*Call Ident MostCommonBoundary* 10a⟩≡

```
rowData = IdentMostCommonBoundary(matFull, 2)
colData = IdentMostCommonBoundary(matFull, 1)
TCRsink("CIMCB", rowData, colData)
```

Uses `IdentMostCommonBoundary` 14b and `TCRsink` 7.

Example values for **ToyExComplete.csv** `(ID: CIMCB)`

```
> rowData
[1]  5 14

> colData
[1]  4 11
```

We construct the interim `rowslist` taking every non-empty row before the most common start of the numbers block (`rowData[1]`) and assigning these to the `label` region. The numbers block (which is bounded by `rowData[1]` and `rowData[2]`) is assigned to the `data` region. The interim `colslist` is constructed in the same manner.

10b ⟨*Construct rowslist and colslist* 10b⟩≡

```
rowslist = list(label = rowNonempty[rowNonempty < rowData[1]],
                data = rowNonempty[(rowNonempty >= rowData[1]) &
                                   (rowNonempty <= rowData[2])])
colslist = list(label = colNonempty[colNonempty < colData[1]],
                data = colNonempty[(colNonempty >= colData[1]) &
                                   (colNonempty <= colData[2])])
TCRsink("CRAC", rowslist, colslist)
```

Uses `TCRsink` 7.

Example values for **ToyExComplete.csv** (ID: CRAC)

```
> rowslist
$label
[1] 1 2 3 4

$data
 [1]  5  6  7  8  9 10 11 12 13 14


> colslist
$label
[1] 1 2

$data
[1]  4  5  6  7  8  9 10 11
```

As the `MostCommonBoundary` algorithm searches for the data region, it can be conservative with respect to the rows and columns assigned to data. Under most circumstances this causes no problems, but in certain rare cases of mismatched column labels, there are column labels that are outside the data region (that is, the column label is not over the data it is the label of, hence mismatched). To correct for this, we do the following:

1. If `matRowLabel` isn't all empty
2. Shift any fully empty columns on the right to `cols$data`

11a ⟨*Cleanup MostCommonBoundary Results* 11a⟩≡

```
matRowLabel = matFull[rowslist$data, colslist$label,drop=FALSE]
if(!all(is.na(matRowLabel)) && ncol(matRowLabel) > 1){
  RowLabelNonempty = IdentNonEmpty(matRowLabel, 2)
  if(max(RowLabelNonempty) < ncol(matRowLabel)){
    toshift = (max(RowLabelNonempty) + 1):ncol(matRowLabel)
    colslist$data = c(colslist$label[toshift], colslist$data)
    colslist$label = colslist$label[-toshift]
  }
}
```

Uses `IdentNonEmpty` 13a.

3.2 Identification - Auxiliary

The Auxiliary Ident algorithms should take two arguments, `matFull` and `IdentResult`. They should return an `IdentResult`.

11b ⟨*Ident Auxiliary* 11b⟩≡

⟨*Ident by Sequence* 12a⟩

3.2.1 Ident by Sequence

Search for fully numeric row labels (e.g. Years) that were misidentified as data, by checking if the numbers follow some fixed sequence. If such a situation is found (result is not `NA`), we update `IdentResult`. This is intended to be used in conjunction with the *Ident by Most Common Boundary* Primary algorithm, which assumes numbers to be data, and not labels.

Currently the algorithm is conservative, only making the check if the current `matRowLabel` is empty (`ncol = 0`, or all `NA`s), and only accepting a sequence of fixed difference, with no gaps or jumps, e.g.

- 1 2 3 4, then a sequence
- 1 2 4 5, then not a sequence

12a ⟨*Ident by Sequence* 12a⟩≡

```
IdentbySequence =
  function(matFull, IdentResult)
  with(IdentResult, {
    matRowLabel = matFull[rows$data, cols$label]
    ⟨If empty take next column 12b⟩
    ⟨Check if sequence 12c⟩
  })
TTLFaliasAdd("IdentAuxiliary", "IdentbySequence", "sequence",
             "Base Algorithm", paste("Search for fully numeric row",
             "labels (e.g. Years) that were misidentified as data"))
```

Uses `IdentResult` 26a and `TTLFaliasAdd` 8.

12b ⟨*If empty take next column* 12b⟩≡

```
if(all(is.na(matRowLabel))){
  cols$label = cols$data[1]
  cols$data = cols$data[-1]
  IdentbySequence(matFull, list(rows = rows, cols = cols))
}
```

Check to see if all diffs are equal, but original values are not. If it is, we have a sequence and we return an updated `IdentResult`.

12c ⟨*Check if sequence* 12c⟩≡

```
else{
  matRowLabel = suppressWarnings(as.numeric(matRowLabel))
  if(length(unique(matRowLabel)) > 1 &&
     length(unique(diff(matRowLabel))) == 1)
    list(rows = rows, cols = cols)
  else IdentResult
}
```

Uses `IdentResult` 26a.

3.3 Identification - Support

Here we discuss the supporting functions called by the Primary and Auxiliary functions. Each chunk corresponds to a separate supporting function.

12d ⟨*Ident Support* 12d⟩≡

⟨*Ident Non Empty* 13a⟩
⟨*Ident Pattern* 13b⟩
⟨*Ident Most Common Boundary* 14b⟩

3.3.1 IdentNonEmpty

Given a matrix (`mat`) and a margin (1 for rows, 2 for columns), return a vector giving the indices of non-empty rows or columns. Can specify a different empty identifying function (default `is.na`). Procedure:

1. Compute `isnonempty`, a logical vector about whether the rows or cols are not empty.
2. Use `which` on `isnonempty` to get indices.

13a ⟨*Ident Non Empty* 13a⟩≡

```
IdentNonEmpty =
  function(mat, margin, emptyident = is.na){
    isnonempty = apply(mat, margin, function(x) !all(emptyident(x)))
    which(isnonempty)
  }
```

Defines:
`IdentNonEmpty`, used in chunks 9d, 11a, and 16a.

3.3.2 IdentPattern

Attempt to discern a repeating pattern in `vec`, which can be a vector of any type (which is coerced to `character`). The returned value is the grouping number for the repeating pattern, or the length of `vec` if there is no repeating pattern, e.g.

- `vec` = 1 1 1 1, then return 1
- `vec` = 3 4 3 4, then return 2
- `vec` = 1 2 3 4, then return 4
- `vec` = 1 2 3 1, then return 4

`IdentPattern` does this fairly efficiently by use of regular expressions and `match`.

13b ⟨*Ident Pattern* 13b⟩≡

```
IdentPattern =
  function(vec){
    ⟨Look for potential repeat 13c⟩
    ⟨Check if pattern repeats 14a⟩
  }
```

Defines:
`IdentPattern`, used in chunk 17a.

Look for when unique values of `vec` repeat, and see if the distance (`diff`) between these are equal (hence the `unique` of the `diff` result will be of length 1). If it is, we take this as our potential repeating point and move on.

If the value does not repeat at all, `diff` will return a `vector` of length 0, which is adjusted to the length of `vec`.

13c ⟨*Look for potential repeat* 13c⟩≡

```
matchvec = match(vec, unique(vec))
for(i in 1:length(unique(matchvec))){
  repind = unique(diff(which(matchvec == i)))
  if(length(repind) == 0)
    repind = length(vec)
  if(length(repind) == 1)
    break
}
```

We combine the first `repind` elements of `vec` and collapse this into a single string. A `grep` is then called on the entire `vec` that has also been collapsed into a single string, checking to see if the entire string can be matched to some repeat of the aforementioned collapsed string of the first `repind` elements. If it can, we have a repeating pattern and thus return `repind`. Otherwise, we return the length of `vec`.

14a ⟨*Check if pattern repeats* 14a⟩≡

```
curseg = paste0("^(", paste(vec[1:repind], collapse = ""), ")+$")
if(length(grep(curseg, paste(vec, collapse = ""))) > 0)
  repind else length(vec)
```

3.3.3 IdentMostCommonBoundary

Search for the most common first and last rows/cols to identify a block (rectangular region) of numbers. Procedure:

1. Suppose `margin = 2`, then loop through each column and search for cells containing numbers.
2. Compute the first row with a number for each column (`nstarts`), and do the same for the last row (`nends`).
3. Return the most common first and last rows.

14b ⟨*Ident Most Common Boundary* 14b⟩≡

```
IdentMostCommonBoundary =
  function(matFull, margin){
    isnumber = suppressWarnings(apply(matFull, margin,
      function(x) which(!is.na(as.numeric(x)))))
    nstarts = table(sapply(isnumber,
      function(x) if(length(x) > 0) min(x) else NA))
    nends = table(sapply(isnumber,
      function(x) if(length(x) > 0) max(x) else NA))
    as.numeric(names(c(which.max(nstarts), which.max(rev(nends)))))
  }
```

Defines:
`IdentMostCommonBoundary`, used in chunk 10a.

4 Discern Parentage

The purpose of **Discern Parentage** is to understand the hierarchical structure (the *parentage*) of the row and column labels. The output will be the `rowplist` and `colplist`, the row and column parentage lists. TO DO explanation of plist.

We separate the Parentage functions into five groups.

Pare Pre Row contain pre-requisite algorithms that tidy up the Row Labels for correct operation of the Main Parentage algorithm. Any combination of these algorithms, in any order, can be chosen when calling `TableToLongForm`. The current implementation of TableToLongForm has no Pre Row algorithms.

Pare Pre Col contain pre-requisite algorithms that tidy up the Column Labels for correct operation of the Main Parentage algorithm. Any combination of these algorithms, in any order, can be chosen when calling `TableToLongForm`.

Pare Front is a simple 'front-end' function that makes the appropriate first call to `PareMain`.

Pare Main contains the Main algorithm that will recursively call itself until the all parentage is discerned.

Pare Low Level contains low-level functions called by the Main function.

15a ⟨*Discern Parentage* 15a⟩≡
⟨*Pare Pre Row* 15b⟩
⟨*Pare Pre Col* 15c⟩
⟨*Pare Front* 19a⟩
⟨*Pare Main* 19b⟩
⟨*Pare Low Level* 21c⟩

4.1 Parentage - Pre Row

Parentage Pre Row algorithms should take two arguments, `matData` and `matRowLabel`. They should return a named list containing two elements, `matData` and `matRowLabel`.

The current implementation of TableToLongForm has no Pre Row algorithms, but has support for external modules that add Pre Row algorithms.

15b ⟨*Pare Pre Row* 15b⟩≡
```
## Empty
```

4.2 Parentage - Pre Col

Parentage Pre Col algorithms should take two arguments, `matData` and `matColLabel`. They should return a named list containing two elements, `matData` and `matColLabel`.

15c ⟨*Pare Pre Col* 15c⟩≡
⟨*Mismatched Col Labels* 16a⟩
⟨*Misaligned Col Parent* 16b⟩
⟨*Multirow Col Labels* 18⟩

Column Label	
	1
	2
	3

Column Label	
	1
	2
	3

Table 1: An example of mismatched column labels. The label is in a different column to the data it belongs to. The algorithm can detect this as mismatched as they have the same number of non-empty columns (1), and have empty columns in each subset (seen easily in the left table as the 2 empty cells). Such cases can occur due to some misguided attempts to visually align the label to the data (e.g. table on the right).

4.2.1 Case Mismatched Column Labels

We check for any mismatched column labels by checking if there are the same number of non-empty columns for the two subsets, and that there are empty columns in the subsets, which together imply mismatched column labels. If that is the case, we update our mat Subsets as required.

16a ⟨*Mismatched Col Labels* 16a⟩≡

```
ParePreColMismatch =
  function(matData, matColLabel){
    colsData = IdentNonEmpty(matData, 2)
    colsLabels = IdentNonEmpty(matColLabel, 2)
    if(length(colsData) == length(colsLabels))
      if(ncol(matData) != length(colsData)){
        matColLabel = matColLabel[,colsLabels,drop=FALSE]
        matData = matData[,colsData,drop=FALSE]
      }
    list(matData = matData, matColLabel = matColLabel)
  }
TTLFaliasAdd("ParePreCol", "ParePreColMismatch", "mismatch",
             "Base Algorithm", paste("Correct for column labels",
             "not matched correctly over data (label in a",
             "different column to data)"))
```

Uses `IdentNonEmpty` 13a and `TTLFaliasAdd` 8.

4.2.2 Case Misaligned Column Parents

We correct for any misaligned column parents by using pattern matching to detect parent-groupings, and then realigning the parents.

16b ⟨*Misaligned Col Parent* 16b⟩≡

```
ParePreColMisaligned =
  function(matData, matColLabel){
    TCRsink("MCPBefore", matColLabel)
    for(i in 1:nrow(matColLabel)){
      currow = matColLabel[i,]
      ⟨Search for Pattern 17a⟩
      ⟨Align Column Parents 17b⟩
    }
    TCRsink("MCPAfter", matColLabel)
    list(matData = matData, matColLabel = matColLabel)
  }
TTLFaliasAdd("ParePreCol", "ParePreColMisaligned", "misalign",
             "Base Algorithm", paste("Correct for column labels",
             "not aligned correctly over data (parents not",
             "positioned on the far-left, relative to their",
             "children in the row below)"))
```

Uses `TCRsink` 7 and `TTLFaliasAdd` 8.

Example values for **ToyExComplete.csv** (ID: MCPBefore)

```
> matColLabel
     V4       V5            V6       V7       V8       V9
[1,] NA       NA            NA       NA       NA       NA
[2,] NA       "Col Parent1" NA       NA       NA       "Col Parent2"
[3,] "Col"    "Col"         "Col"    "Col"    "Col"    "Col"
[4,] "Child1" "Child2"      "Child3" "Child4" "Child1" "Child2"
```

Example values for **ToyExComplete.csv** (ID: MCPAfter)

```
> matColLabel
     V4            V5       V6       V7       V8            V9
[1,] NA            NA       NA       NA       NA            NA
[2,] "Col Parent1" NA       NA       NA       "Col Parent2" NA
[3,] "Col"         "Col"    "Col"    "Col"    "Col"         "Col"
[4,] "Child1"      "Child2" "Child3" "Child4" "Child1"      "Child2"
```

	Column Parent1			Column Parent2	
Child1	Child2	Child3	Child1	Child2	Child3

Table 2: An example of misaligned column parents. For our low-level Parentage algorithm to work, we want the Column Parents to be in the left-most cell of their parent-grouping.

The value of `curPattern` will be the following:

- If completely empty (all `NA`), return `NA`.
- If any empty, check pattern of emptiness. In the above Table row 1, this will find the pattern: NonEmpty-Empty-NonEmpty which occurs twice. Hence return 2.
- Else, all cells are non-empty, check pattern of contents. In the above Table row 2, this will find the pattern: Child1-Child2-Child3 which occurs twice. Hence return 2.

17a ⟨*Search for Pattern* 17a⟩≡

```
curPattern =
  if(all(is.na(currow))) NA
  else if(any(is.na(currow))) IdentPattern(is.na(currow))
  else IdentPattern(currow)
```

Uses `IdentPattern` 13b.

For each subset of the row (based on pattern), move any empty cells (`NA`) to the end, hence aligning the non-empty cell (the parent) to the left.

17b ⟨*Align Column Parents* 17b⟩≡

```
if(!is.na(curPattern)){
  nParents = length(currow)/curPattern
  for(j in 1:nParents){
    curcols = 1:curPattern + curPattern * (j - 1)
    cursub = currow[curcols]
    currow[curcols] = c(cursub[!is.na(cursub)], cursub[is.na(cursub)])
    TCRsink("ACP", cursub, currow[curcols])
  }
  matColLabel[i,] = currow
}
```

Uses `TCRsink` 7.

Example values for **ToyExComplete.csv** (ID: ACP)

```
> cursub
          V4            V5            V6            V7
          NA "Col Parent1"            NA            NA

> currow[curcols]
          V4            V5            V6            V7
"Col Parent1"            NA            NA            NA
```

4.2.3 Case Multi-row Column Labels

It is also quite common for Col Labels that are too wide to be physically split over multiple rows to manage the width of the labels. For now, we simply assume that any rows that are not full (and hence not parents) should all really be a single row of children, and collapse these.

18 ⟨*Multirow Col Labels* 18⟩≡

```
ParePreColMultirow =
  function(matData, matColLabel){
    fullrows = apply(matColLabel, 1, function(x) all(!is.na(x)))
    if(any(diff(fullrows) > 1))
      warning("full rows followed by not full rows!")
    if(any(fullrows)){
      pastestring = ""
      pasterows = which(fullrows)
      for(i in 1:length(pasterows))
        pastestring[i] = paste0("matColLabel[", pasterows[i],
                     ",,drop=FALSE]")
      collapsedlabels =
        eval(parse(text = paste0("paste(",
                     paste(pastestring, collapse = ", "), ")")))

      TCRsink("MCLBefore", matColLabel)
      matColLabel = rbind(matColLabel[!fullrows,,drop=FALSE],
        collapsedlabels, deparse.level = 0)
      TCRsink("MCLAfter", matColLabel)
    }
    list(matData = matData, matColLabel = matColLabel)
  }
TTLFaliasAdd("ParePreCol", "ParePreColMultirow", "multirow",
             "Base Algorithm", paste("Merge long column labels",
             "that were physically split over multiple rows",
             "back into a single label"))
```

Uses `TCRsink` 7 and `TTLFaliasAdd` 8.

Example values for **ToyExComplete.csv** (ID: MCLBefore)

```
> matColLabel
     V4            V5       V6       V7       V8            V9
[1,] NA            NA       NA       NA       NA            NA
[2,] "Col Parent1" NA       NA       NA       "Col Parent2" NA
[3,] "Col"         "Col"    "Col"    "Col"    "Col"         "Col"
[4,] "Child1"      "Child2" "Child3" "Child4" "Child1"      "Child2"
```

Example values for **ToyExComplete.csv** (ID: MCLAfter)

```
> matColLabel
     V4            V5           V6           V7           V8
[1,] NA            NA           NA           NA           NA
[2,] "Col Parent1" NA           NA           NA           "Col Parent2"
[3,] "Col Child1"  "Col Child2" "Col Child3" "Col Child4" "Col Child1"
     V9
[1,] NA
[2,] NA
[3,] "Col Child2"
```

4.3 Parentage - Front

This front end function takes the `matLabel`, which can be the `matRowLabel` or the transpose of the `matColLabel`, and constructs an initialising `plist`, which is used to make the first call to the Main function.

19a ⟨*Pare Front* 19a⟩≡

```
PareFront =
  function(matLabel)
  PareMain(matSub = matLabel, plist =
           list(rows = 1:nrow(matLabel), cols = 1:ncol(matLabel)))
```

Defines:
`PareFront`, used in chunks 26b and 27.
Uses `PareMain` 19b.

4.4 Parentage - Main

The purpose of the `PareMain` function is to identify (or *Discern*, to better differentiate this stage from the *Identification* stage) hierarchical relationships (the *Parentage*) in the data.

It first makes various checks for fringe cases, then calls various detection algorithms (`Pare Low Levels`) to discern the parentage.

19b ⟨*Pare Main* 19b⟩≡

```
PareMain =
  function(matSub, plist){
    ⟨If only one column 20a⟩
    ⟨If first column empty 20b⟩
    ⟨If only one row 20c⟩
    ⟨If first cell empty 21a⟩
    ⟨Otherwise call Pare Low Levels 21b⟩
    class(res) = "plist"
    res
  }
```

Defines:
`PareMain`, used in chunks 19–21.

If only one column is found then this means we are in the right-most column (or there was only one column to begin with), and hence the currently examined cells cannot be parents. We return the rows of these children as a vector, with names that correspond to their labels.

20a ⟨*If only one column* 20a⟩≡

```
if(length(plist$cols) == 1){
  res = structure(plist$rows, .Names = matSub[plist$rows, plist$cols])
  res = attrLoc(res, cols = plist$col)
  TCRsink("IOOC", plist, res)
}
```

Uses `attrLoc` 6b and `TCRsink` 7.

Example values for **ToyExComplete.csv** `(ID: IOOC)`

```
> plist
$rows
[1] 3 4

$cols
[1] 2


> res
Row Child-Child1 Row Child-Child2
               3               4
```

If the first column is found to be empty, then we will shift to the next column (which we know exists because we passed the check for only one column).

20b ⟨*If first column empty* 20b⟩≡

```
else if(all(is.na(matSub[plist$rows, plist$cols[1]]))){
  plist$cols = plist$cols[-1]
  res = PareMain(matSub, plist)
}
```

Uses `PareMain` 19b.

If only one row is found then our row is a parent to itself (we know there are children in the row as we passed the check for only one column). We return the row as a numeric vector, nested in a list using correct parentage and names of the parentage within the row.

20c ⟨*If only one row* 20c⟩≡

```
else if(length(plist$rows) == 1){
  res = structure(plist$rows,
    .Names = matSub[plist$rows, plist$cols[length(plist$cols)]])
  res = attrLoc(res, cols = plist$cols[length(plist$cols)])
  for(i in (length(plist$cols) - 1):1){
    res = list(res)
    names(res) = matSub[plist$rows, plist$cols[i]]
    res = attrLoc(res, rows = plist$rows, cols = plist$cols[i])
  }
  TCRsink("IOOR", plist, res)
}
```

Uses `attrLoc` 6b and `TCRsink` 7.

Example values for **ToyExComplete.csv** (ID: IOOR)

```
> res
Never occurs
```

If the first cell is empty, after all previous checks, then this is an unrecognised format and we return a warning message.

21a ⟨*If first cell empty* 21a⟩≡

```
else if(is.na(matSub[plist$rows[1], plist$cols[1]])){
  warning("cell[1, 1] is empty")
  print(plist)
  res = NA
}
```

If we have passed all the checks, we can then call the Low Level `Pare` functions. We first call `ByEmptyRight` to check for *empty right* situations. If none are found, it returns `NA`, in which case we try `ByEmptyBelow` instead.

We then loop through each element of the returned list and call the main function, as per the recursive nature of the function.

21b ⟨*Otherwise call Pare Low Levels* 21b⟩≡

```
else{
  res = PareByEmptyRight(matSub, plist)
  if(any(is.na(res)))
    res = PareByEmptyBelow(matSub, plist)
  for(i in 1:length(res))
    res[[i]] = PareMain(matSub, res[[i]])
  res
}
```

Uses `PareByEmptyBelow` 24, `PareByEmptyRight` 21d, and `PareMain` 19b.

4.5 Parentage - Low Level Functions

The Low Level Parentage functions are called by the Main Parentage function. In particular, `ByEmptyRight` is always called first. Then `ByEmptyBelow` is called on the results of the above.

21c ⟨*Pare Low Level* 21c⟩≡

⟨*Pare By Empty Right* 21d⟩
⟨*Pare By Empty Below* 24⟩

4.5.1 Pare By Empty Right

We check to see if we have an *empty right* situation. If we do not, we return `NA`.

21d ⟨*Pare By Empty Right* 21d⟩≡

```
PareByEmptyRight =
  function(matSub, plist)
  with(plist,
       if(all(is.na(matSub[rows[1], cols[-1]]))){
         ⟨Check for Other Empty Rights 21e⟩
         ⟨Case Single Empty Right 22⟩
         ⟨Case Multiple Empty Rights 23⟩
         res
       } else NA)
```

Defines:
`PareByEmptyRight`, used in chunk 21b.

21e ⟨*Check for Other Empty Rights* 21e⟩≡

```
emptyrights = apply(matSub[rows, cols[-1],drop=FALSE], 1,
  function(x) all(is.na(x)))
rowemptyright = rows[emptyrights]
```

1	***New Zealand***	
2	**Auckland**	
3	Accounting	Male
4		Female
5	Economics	Male
6		Female
7	Statistics	Male
8		Female
9	**Wellington**	
10	Economics	Male
11		Female
12	Statistics	Male
13		Female
14	***Australia***	
15	**Sydney**	
16	Accounting	Male
17		Female
18	Economics	Male
19		Female

Consider the toy example on the left.
In this case we do not have a simple `ByEmptyRight` structure. We have *super-parents* in the form of countries (New Zealand and Australia), and also *parents* in the form of cities (Auckland, Wellington and Sydney). To handle situations such as this, we must **Check for Other Empty Rights**.
If only a **Single Empty Right** is found, the situation is simple and we simply pass on the children of the single parent for the next iteration of `PareMain`.
However, if **Multiple Empty Rights** are found, we must identify the super-parents, and pass on the *children* of these super-parents (which would, in turn, contain parents and their children) as a list, to be handled in the next iteration of `PareMain`. In this example, we would have a list of length 2. The first element of the list would contain the `plist` with `rows` 2 to 13 (corresponding to the children of the New Zealand super-parent). The second element would have `rows` 15 to 19.

In the case of only a single empty right, we know there is only a single parent, which is the first line. Thus we take everything except the first line (which will be the rows of the children of this parent) and pass this through with correct naming.

22 ⟨*Case Single Empty Right* 22⟩≡

```
if(length(rowemptyright) == 1){
  res = list(list(rows = rows[-1], cols = cols))
  names(res) = matSub[rows[1], cols[1]]
  res = attrLoc(res, rows = rows[1], cols = cols[1])
  TCRsink("CSER", res)
}
```

Uses `attrLoc` 6b and `TCRsink` 7.

Example values for **ToyExComplete.csv** (ID: CSER)

```
> res
Never occurs
```

In the case of multiple empty rights, we first call `diff` to compute the gap in rows between the empty rights. If the value of `rowdiff[i]` is 1, this means there is no gap between the i^{th} `rowemptyright` and the (i + 1) `rowemptyright`. This happens with *super-parents* as described in the example above. In this case, we gather these super-parents and ignore all other `rowemptyright` (the parents inside the super-parents will be handled at the next iteration of `PareMain`). Note, we assume there are never any super-super-parents (i.e. we can only handle a maximum of 2-levels of parentage in the same column).

Whether or not super-parents were identified, we compute the rows for the children of each parent (or super-parent) identified by `rowemptyright` and pass this through as a list, with correct naming.

23 ⟨*Case Multiple Empty Rights* 23⟩≡

```
else{
  rowdiff = diff(rowemptyright)
  if(any(rowdiff == 1))
    rowemptyright = rowemptyright[c(rowdiff == 1, FALSE)]

  rowstart = pmin(rowemptyright + 1, max(rows))
  rowend = c(pmax(rowemptyright[-1] - 1, min(rows)), max(rows))

  res = list()
  for(i in 1:length(rowstart))
    res[i] = list(list(rows = rowstart[i]:rowend[i], cols = cols))
  names(res) = matSub[rowemptyright, cols[1]]
  res = attrLoc(res, rows = rowemptyright, cols = cols[1])
  TCRsink("CMER", res)
}
```

Uses `attrLoc` 6b and `TCRsink` 7.

Example values for **ToyExComplete.csv** (ID: CMER)

```
> res
$`Row Super-Parent`
$`Row Super-Parent`$rows
[1]  2  3  4  5  6  7  8  9 10

$`Row Super-Parent`$cols
[1] 1 2
```

4.5.2 Pare By Empty Below

We check which cells are empty below (there should be at least 1 based on previous checks). Based on this, we compute the rows for the children of each parent and pass this through as a list, with correct naming.

24 ⟨*Pare By Empty Below* 24⟩≡

```
PareByEmptyBelow =
  function(matSub, plist)
  with(plist, {
    emptybelow = is.na(matSub[rows, cols[1]])
    rowstart = rows[!emptybelow]
    rowend = c(rowstart[-1] - 1, max(rows))
    res = list()
    for(i in 1:length(rowstart))
      res[i] = list(list(rows = rowstart[i]:rowend[i], cols = cols[-1]))
    names(res) = matSub[rowstart, cols[1]]
    res = attrLoc(res, rows = rowstart, cols = cols[1])
    TCRsink("PBEB", res)
    res
  })
```

Defines:
PareByEmptyBelow, used in chunk 21b.
Uses attrLoc 6b and TCRsink 7.

Example values for **ToyExComplete.csv** (ID: PBEB)

```
> res
$`Row Child1`
$`Row Child1`$rows
[1] 3 4

$`Row Child1`$cols
[1] 2


$`Row Child2`
$`Row Child2`$rows
[1] 5 6

$`Row Child2`$cols
[1] 2
```

---

5 Reconstruction

We separate the Reconstruction functions into two groups.

Recons Main contains the main function that is called by the *Front End* function.

Recons Low Level contains supporting functions called by the *Recons Main* function.

25a ⟨*Reconstruction* 25a⟩≡
⟨*Recons Main* 25b⟩
⟨*Recons Low Level* 28⟩

5.1 Reconstruction - Main Function

The `ReconsMain` function is, in a manner of speaking, the true `TableToLongForm` function, as it makes the calls to `IdentMain` and `PareFront`, in conjunction with its own `Recons Low Level` functions, to carry out the conversion.

25b ⟨*Recons Main* 25b⟩≡

```
ReconsMain =
  function(matFull, IdentResult,
           IdentPrimary, IdentAuxiliary,
           ParePreRow, ParePreCol){
    ⟨Call Ident Algos 26a⟩
    ⟨Reconstruct Row Labels 26b⟩
    ⟨Reconstruct Col Labels 27⟩
  }
```

Defines:
`ReconsMain`, used in chunk 4a.
Uses `IdentResult` 26a.

If a custom `IdentResult` is given, we use that. Otherwise (`IdentResult == NULL`), we call the Ident algorithms as specified by the arguments, `IdentPrimary` and `IdentAuxiliary`. Only 1 `IdentPrimary` is accepted, while any number of `IdentAuxiliary` algorithms can be specified, which will be called in the order they are given.

26a ⟨*Call Ident Algos* 26a⟩≡

```
if(is.null(IdentResult)){
  IdentPrimary = TTLFaliasGet("IdentPrimary", IdentPrimary)
  IdentResult = do.call(IdentPrimary, list(matFull = matFull))
  if(!is.null(IdentAuxiliary))
    for(AuxAlgo in IdentAuxiliary){
      AuxAlgo = TTLFaliasGet("IdentAuxiliary", AuxAlgo)
      IdentResult = do.call(AuxAlgo,
        list(matFull = matFull, IdentResult = IdentResult))
    }
}
```

Defines:
`IdentResult`, used in chunks 4a, 12, and 25–27.
Uses `TTLFaliasGet` 8.

We create the subsets of `matFull` using `IdentResult`:

matData Which should contain just the Data.

matRowLabel Which should contain just the Row Labels.

We then call the `ParePreRow` algorithms in the order given (assuming there are any), to tidy up `matData` (rarely) and `matRowLabel` (primarily), before calling `PareFront` to discern the parentage of the Row Labels.

We then use this to reconstruct the portion of the LongForm Dataframe relating to the Row Labels and assign this to `rowvecs`.

26b ⟨*Reconstruct Row Labels* 26b⟩≡

```
matData = with(IdentResult,
  matFull[rows$data, cols$data,drop=FALSE])
matRowLabel = with(IdentResult,
  matFull[rows$data, cols$label,drop=FALSE])
if(!is.null(ParePreRow))
  for(PreAlgo in ParePreRow){
    PreAlgo = TTLFaliasGet("ParePreRow", PreAlgo)
    PreOut = do.call(PreAlgo,
      list(matData = matData, matRowLabel = matRowLabel))
    matData = PreOut$matData
    matRowLabel = PreOut$matRowLabel
  }
rowplist = PareFront(matRowLabel)
rowvecs = ReconsRowLabels(rowplist)
TCRsink("RRL", rowplist, rowvecs)
```

Defines:
`rowplist`, used in chunk 27.
`rowvecs`, used in chunks 27, 29, and 30.
Uses `IdentResult` 26a, `PareFront` 19a, `ReconsRowLabels` 29a, `TCRsink` 7, and `TTLFaliasGet` 8.

Example values for **ToyExComplete.csv** (ID: RRL)

```
> rowplist
$`Row Super-Parent`
+ Row Parent1 (2, 1)
- + Row Child1 (3, 1)
- - + Row Child-Child1 (3, 2)
- - + Row Child-Child2 (4, 2)
- + Row Child2 (5, 1)
- - + Row Child-Child1 (5, 2)
- - + Row Child-Child2 (6, 2)
+ Row Parent2 (7, 1)
- + Row Child1 (8, 1)
- - + Row Child-Child1 (8, 2)
- - + Row Child-Child2 (9, 2)
- + Row Child2 (10, 1)
- - + Row Child-Child2 (10, 2)
```

```
> rowvecs
 [,1]                [,2]           [,3]          [,4]
 "Row Super-Parent" "Row Parent1" "Row Child1" "Row Child-Child1"
 "Row Super-Parent" "Row Parent1" "Row Child1" "Row Child-Child2"
 "Row Super-Parent" "Row Parent1" "Row Child2" "Row Child-Child1"
 "Row Super-Parent" "Row Parent1" "Row Child2" "Row Child-Child2"
 "Row Super-Parent" "Row Parent2" "Row Child1" "Row Child-Child1"
 "Row Super-Parent" "Row Parent2" "Row Child1" "Row Child-Child2"
```

We create a further subset of `matFull` using `IdentResult`:

matColLabel Which should contain just the Column Labels.

We then call the `ParePreCol` algorithms in the order given (assuming there are any), to tidy up `matData` (rarely) and `matColLabel` (primarily), before calling `PareFront` on the transpose of `matColLabel` (as the Main Parentage algorithm is written to work for Row Labels) to discern the parentage of the Column Labels.

We then call `ReconsColLabels` which in truth reconstructs the entire LongForm Dataframe by making use of the `rowvecs` generated above.

We finally return the full output back to the main `TableToLongForm` function.

27 ⟨*Reconstruct Col Labels* 27⟩≡

```
matColLabel = with(IdentResult,
  matFull[rows$label, cols$data,drop=FALSE])
if(!is.null(ParePreCol))
  for(PreAlgo in ParePreCol){
    PreAlgo = TTLFaliasGet("ParePreCol", PreAlgo)
    PreOut = do.call(PreAlgo,
      list(matData = matData, matColLabel = matColLabel))
    matData = PreOut$matData
    matColLabel = PreOut$matColLabel
  }
colplist = PareFront(t(matColLabel))
matDataReduced = matData[unlist(rowplist),,drop=FALSE]
res = ReconsColLabels(colplist, matDataReduced, rowvecs)
TCRsink("RCL", colplist, res)
list(datafr = res, oriTable = matFull, IdentResult = IdentResult,
     rowplist = rowplist, colplist = colplist)
```

Uses `IdentResult` 26a, `PareFront` 19a, `ReconsColLabels` 29b, `rowplist` 26b, `rowvecs` 26b, `TCRsink` 7, and `TTLFaliasGet` 8.

Example values for **ToyExComplete.csv** (ID: RCL)

```
> colplist
$`Col Parent1`
+ Col Child1 (1, 3)
+ Col Child2 (2, 3)
+ Col Child3 (3, 3)
+ Col Child4 (4, 3)

$`Col Parent2`
+ Col Child1 (5, 3)
+ Col Child2 (6, 3)
+ Col Child3 (7, 3)
+ Col Child4 (8, 3)


> res
      UNKNOWN           UNKNOWN     UNKNOWN    UNKNOWN           UNKNOWN
1 Col Parent1 Row Super-Parent Row Parent1 Row Child1 Row Child-Child1
2 Col Parent1 Row Super-Parent Row Parent1 Row Child1 Row Child-Child2
3 Col Parent1 Row Super-Parent Row Parent1 Row Child2 Row Child-Child1
4 Col Parent1 Row Super-Parent Row Parent1 Row Child2 Row Child-Child2
5 Col Parent1 Row Super-Parent Row Parent2 Row Child1 Row Child-Child1
6 Col Parent1 Row Super-Parent Row Parent2 Row Child1 Row Child-Child2
  Col Child1 Col Child2 Col Child3 Col Child4
1         12         22         32         42
2         13         23         33         43
3         14         24         34         44
4         15         25         35         45
5         17         27         37         47
6         18         28         38         48
```

5.2 Reconstruction - Low Level Functions

The Low Level Reconstruction functions are called by the Main Reconstruction function. In particular, `ReconsRowLabels` is always called first and its results are one of the arguments for `ReconsColLabels`, which finishes the reconstruction of the entire LongForm Dataframe.

28 ⟨*Recons Low Level* 28⟩≡
⟨*Recons Row Labels* 29a⟩
⟨*Recons Column Labels* 29b⟩

5.2.1 Reconstruction - Row Labels

`ReconsRowLabels` iterates down the row parentage list (`plist`) recursively, extracting the names and using this to construct the columns of the finished LongForm Dataframe corresponding to the row labels. The final output is what was shown in the *Reconstruct Row Labels* chunk above as `rowvecs`.

29a ⟨*Recons Row Labels* 29a⟩≡

```
ReconsRowLabels =
  function(plist)
  if(is.list(plist)){
    rowvecs = as.list(names(plist))
    for(i in 1:length(rowvecs))
      rowvecs[[i]] = cbind(rowvecs[[i]], ReconsRowLabels(plist[[i]]))
    do.call(rbind, rowvecs)
  } else as.matrix(names(plist))
```

Defines:
`ReconsRowLabels`, used in chunk 26b.
Uses `rowvecs` 26b.

Example values for **ToyExComplete.csv** `(ID: RRL)`

```
> rowvecs
 [,1]                [,2]           [,3]          [,4]
 "Row Super-Parent" "Row Parent1" "Row Child1" "Row Child-Child1"
 "Row Super-Parent" "Row Parent1" "Row Child1" "Row Child-Child2"
 "Row Super-Parent" "Row Parent1" "Row Child2" "Row Child-Child1"
 "Row Super-Parent" "Row Parent1" "Row Child2" "Row Child-Child2"
 "Row Super-Parent" "Row Parent2" "Row Child1" "Row Child-Child1"
 "Row Super-Parent" "Row Parent2" "Row Child1" "Row Child-Child2"
```

5.2.2 Reconstruction - Column Labels

As with the row labels, `ReconsColLabels` iterates down the column parentage list (`plist`) recursively. We also need to handle the parents differently from the lowest level child. The final output is what was shown in the *Reconstruct Col Labels* chunk above as `res`.

29b ⟨*Recons Column Labels* 29b⟩≡

```
ReconsColLabels =
  function(plist, matData, rowvecs){
    ⟨Recons Col Parents 30a⟩
    ⟨Recons Col Children 30b⟩
    datfr
  }
```

Defines:
`ReconsColLabels`, used in chunks 27 and 30a.
Uses `rowvecs` 26b.

Example values for **ToyExComplete.csv** (ID: RCL)

```
> res
      UNKNOWN           UNKNOWN     UNKNOWN    UNKNOWN           UNKNOWN
1 Col Parent1 Row Super-Parent Row Parent1 Row Child1 Row Child-Child1
2 Col Parent1 Row Super-Parent Row Parent1 Row Child1 Row Child-Child2
3 Col Parent1 Row Super-Parent Row Parent1 Row Child2 Row Child-Child1
4 Col Parent1 Row Super-Parent Row Parent1 Row Child2 Row Child-Child2
5 Col Parent1 Row Super-Parent Row Parent2 Row Child1 Row Child-Child1
6 Col Parent1 Row Super-Parent Row Parent2 Row Child1 Row Child-Child2
  Col Child1 Col Child2 Col Child3 Col Child4
1          12         22         32         42
2          13         23         33         43
3          14         24         34         44
4          15         25         35         45
5          17         27         37         47
6          18         28         38         48
```

Any parents are used to construct additional columns of factors (the labels of the parents) for the LongForm Dataframe, which is attached to the portion previously constructed in `ReconsRowLabels`.

30a ⟨*Recons Col Parents* 30a⟩≡

```
if(is.list(plist)){
  colvecs = as.list(names(plist))
  for(i in 1:length(colvecs)){
    colvecs[[i]] = cbind(colvecs[[i]],
             ReconsColLabels(plist[[i]], matData, rowvecs))
    colnames(colvecs[[i]])[1] = "UNKNOWN"
  }
  datfr = do.call(rbinddf, colvecs)
}
```

Uses `rbinddf` 5c, `ReconsColLabels` 29b, and `rowvecs` 26b.

For the lowest level child, we extract the relevant 'data bits' from the original table and bind it to our Dataframe, using the lowest level child as the labels of these columns of data values.

30b ⟨*Recons Col Children* 30b⟩≡

```
else{
  datbit = matData[,plist,drop=FALSE]
  TCRsink("RCC", plist, matData, datbit)
  datlist = NULL
  for(j in 1:ncol(datbit)){
    asnumer = suppressWarnings(as.numeric(datbit[,j]))
    if(all(is.na(datbit[,j])) || !all(is.na(asnumer)))
      datlist[[j]] = asnumer
    else
      datlist[[j]] = datbit[,j]
  }
  datbit = do.call(cbind, datlist)
  ## Specify row.names to avoid annoying warnings
  datfr =
    cbind(as.data.frame(rowvecs, row.names = 1:nrow(rowvecs)), datbit)
  colnames(datfr) =
    c(rep("UNKNOWN", length = ncol(rowvecs)), names(plist))
}
```

Uses `rowvecs` 26b and `TCRsink` 7.

6 Chunk Index

⟨*Reconstruction* 25a⟩
⟨*Search for Pattern* 17a⟩
⟨*Setup diagnostics file* 5a⟩
⟨*TableToLongForm.R* 3a⟩

7 Identifier Index

Numbers indicate the chunks in which the function appears. Underline indicates the chunk where the function is defined.

References

R Core Team, 2013. R: A Language and Environment for Statistical Computing. R Foundation for Statistical Computing, Vienna, Austria.
URL http://www.R-project.org/

Ramsey, N., Sept 1994. Literate programming simplified. IEEE Software 11 (5), 97–105.
URL http://www.cs.tufts.edu/~nr/noweb/

8 Appendix: TCRO

The following appendix is automatically generated and consists of the diagnostics output of various Tables.

8.1 DIATop100BabyBoysNames2011.xls

	1	2	3	4	5	6	7	8	9	10	11	12	13
1	Table 2												
2	Top 100 Baby Boys' Names in New Zealand												
3	December 2004–2011 Years												
4													
5	Rank		2,004			2,005			2,006			2,007	
6			Name		No.	Name		No.	Name		No.	Name	
7													
8		1		Joshua	504		Jack	488		Jack	534		Jack
9		2		Jack	491		Joshua	386		Joshua	406		James
10		3		Benjamin	370		Samuel	340		Daniel	370		Joshua
11		4		Samuel	357		Daniel	321		James	356		Daniel
12		5		Ethan	351		James	318		William	332		William
13		6		Matthew	329		Benjamin	297		Samuel	320		Oliver
14		7		James	327		Liam	284		Jacob	306		Samuel
15		8		Jacob	326		William	284		Thomas	293		Benjamin
16		9		Daniel	325		Ethan	278		Benjamin	282		Ethan
17		10		Liam	315		Jacob	276		Ryan	282		Ryan
18		11		Ryan	312		Ryan	276		Liam	275		Jacob
19		12		William	304		Thomas	262		Oliver	270		Liam
20		13		Thomas	287		Matthew	253		Ethan	258		Thomas
21		14		Caleb	263		Oliver	249		Luke	249		Lucas
22		15		Oliver	250		Caleb	219		Matthew	246		Luke
23		16		Dylan	248		Luke	206		Noah	234		Noah
24		17		Jayden	219		Noah	197		Caleb	217		Riley
25		18		Connor	214		Connor	188		Max	217		Jayden
26		19		Luke	197		Max	179		Jayden	206		Matthew
27		20		Logan	190		Alexander	176		Logan	205		Alexander
28		21		Cameron	183		Cameron	174		Dylan	203		Hunter
29		22		Alexander	172		Dylan	171		Connor	188		Dylan
30		23		Riley	170		Logan	168		Alexander	184		Blake
31		24		Max	168		Jayden	159		Blake	180		Max
32		25		Michael	153		Nathan	158		Riley	169		Caleb
33		26		Joseph	151		Jordan	154		Charlie	164		Lachlan
34		27		Alex	147		Joseph	146		Nathan	164		Logan
35		28		Isaac	144		George	144		Tyler	160		Connor
36		29		Nathan	141		Riley	144		George	154		Tyler
37		30		Blake	137		Blake	139		Joseph	154		Joseph
38		31		George	137		Michael	138		Lucas	149		Cameron
39		32		Jordan	137		Harrison	133		Lachlan	148		George
40		33		Lachlan	134		Tyler	128		Harrison	147		Charlie
41		34		Tyler	134		Alex	125		Cameron	143		Nathan
42		35		Levi	128		Isaac	118		Jordan	142		Alex
43		36		Noah	128		Hunter	113		Isaac	134		Finn

```
> rowData
[1]   8 107
> colData
[1]  2 26
> rowslist
$label
[1] 1 2 3 5 6

$data
  [1]   8   9  10  11  12  13  14  15  16  17  18  19  20  21  22  23  24  25
 [19]  26  27  28  29  30  31  32  33  34  35  36  37  38  39  40  41  42  43
 [37]  44  45  46  47  48  49  50  51  52  53  54  55  56  57  58  59  60  61
 [55]  62  63  64  65  66  67  68  69  70  71  72  73  74  75  76  77  78  79
 [73]  80  81  82  83  84  85  86  87  88  89  90  91  92  93  94  95  96  97
 [91]  98  99 100 101 102 103 104 105 106 107

> colslist
$label
[1] 1

$data
 [1]  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26

> plist
$rows
  [1]   1   2   3   4   5   6   7   8   9  10  11  12  13  14  15  16  17  18
```

```
 [19]  19  20  21  22  23  24  25  26  27  28  29  30  31  32  33  34  35  36
 [37]  37  38  39  40  41  42  43  44  45  46  47  48  49  50  51  52  53  54
 [55]  55  56  57  58  59  60  61  62  63  64  65  66  67  68  69  70  71  72
 [73]  73  74  75  76  77  78  79  80  81  82  83  84  85  86  87  88  89  90
 [91]  91  92  93  94  95  96  97  98  99 100

$cols
[1] 1

> res
  1   2   3   4   5   6
  1   2   3   4   5   6
> rowplist
  1   2   3   4   5   6
  1   2   3   4   5   6
> rowvecs
     [,1]
[1,] "  1"
[2,] "  2"
[3,] "  3"
[4,] "  4"
[5,] "  5"
[6,] "  6"
> matColLabel
     V3     V5     V6     V8     V9     V11
[1,] NA     NA     NA     NA     NA     NA
[2,] NA     NA     NA     NA     NA     NA
[3,] NA     NA     NA     NA     NA     NA
[4,] "2004" NA     "2005" NA     "2006" NA
[5,] "Name" "No." "Name" "No." "Name" "No."
> cursub
    V3     V5
"2004"     NA
> currow[curcols]
    V3     V5
"2004"     NA
> cursub
    V6     V8
"2005"     NA
> currow[curcols]
    V6     V8
"2005"     NA
> cursub
    V9    V11
"2006"     NA
> currow[curcols]
    V9    V11
"2006"     NA
> cursub
   V12    V14
"2007"     NA
> currow[curcols]
   V12    V14
"2007"     NA
> cursub
   V15    V17
"2008"     NA
```

```
> currow[curcols]
   V15    V17
"2008"     NA
> cursub
   V18    V20
"2009"     NA
> currow[curcols]
   V18    V20
"2009"     NA
> cursub
   V21    V23
"2010"     NA
> currow[curcols]
   V21    V23
"2010"     NA
> cursub
   V24    V26
"2011"     NA
> currow[curcols]
   V24    V26
"2011"     NA
> cursub
    V3     V5
"Name"  "No."
> currow[curcols]
    V3     V5
"Name"  "No."
> cursub
    V6     V8
"Name"  "No."
> currow[curcols]
    V6     V8
"Name"  "No."
> cursub
    V9    V11
"Name"  "No."
> currow[curcols]
    V9    V11
"Name"  "No."
> cursub
   V12    V14
"Name"  "No."
> currow[curcols]
   V12    V14
"Name"  "No."
> cursub
   V15    V17
"Name"  "No."
> currow[curcols]
   V15    V17
"Name"  "No."
> cursub
   V18    V20
"Name"  "No."
> currow[curcols]
   V18    V20
"Name"  "No."
```

```
> cursub
   V21    V23
"Name"  "No."
> currow[curcols]
   V21    V23
"Name"  "No."
> cursub
   V24    V26
"Name"  "No."
> currow[curcols]
   V24    V26
"Name"  "No."
> matColLabel
     V3     V5    V6     V8    V9     V11
[1,] NA     NA    NA     NA    NA     NA
[2,] NA     NA    NA     NA    NA     NA
[3,] NA     NA    NA     NA    NA     NA
[4,] "2004" NA    "2005" NA    "2006" NA
[5,] "Name" "No." "Name" "No." "Name" "No."
> matColLabel
     V3     V5    V6     V8    V9     V11
[1,] NA     NA    NA     NA    NA     NA
[2,] NA     NA    NA     NA    NA     NA
[3,] NA     NA    NA     NA    NA     NA
[4,] "2004" NA    "2005" NA    "2006" NA
[5,] "Name" "No." "Name" "No." "Name" "No."
> matColLabel
     V3     V5    V6     V8    V9     V11
[1,] NA     NA    NA     NA    NA     NA
[2,] NA     NA    NA     NA    NA     NA
[3,] NA     NA    NA     NA    NA     NA
[4,] "2004" NA    "2005" NA    "2006" NA
[5,] "Name" "No." "Name" "No." "Name" "No."
> res
$`2004`
$`2004`$rows
[1] 1 2

$`2004`$cols
[1] 5


$`2005`
$`2005`$rows
[1] 3 4

$`2005`$cols
[1] 5


$`2006`
$`2006`$rows
[1] 5 6

$`2006`$cols
[1] 5
```

```
$‘2007‘
$‘2007‘$rows
[1] 7 8

$‘2007‘$cols
[1] 5


$‘2008‘
$‘2008‘$rows
[1]  9 10

$‘2008‘$cols
[1] 5


$‘2009‘
$‘2009‘$rows
[1] 11 12

$‘2009‘$cols
[1] 5


> plist
$rows
[1] 1 2

$cols
[1] 5

> res
Name  No.
   1    2
> plist
$rows
[1] 3 4

$cols
[1] 5

> res
Name  No.
   3    4
> plist
$rows
[1] 5 6

$cols
[1] 5

> res
Name  No.
   5    6
> plist
$rows
```

```
[1] 7 8

$cols
[1] 5

> res
Name  No.
   7    8
> plist
$rows
[1]  9 10

$cols
[1] 5

> res
Name  No.
   9   10
> plist
$rows
[1] 11 12

$cols
[1] 5

> res
Name  No.
  11   12
> plist
$rows
[1] 13 14

$cols
[1] 5

> res
Name  No.
  13   14
> plist
$rows
[1] 15 16

$cols
[1] 5

> res
Name  No.
  15   16
> plist
Name  No.
   1    2
> matData
     V4          V5    V7          V8    V10       V11
[1,] "Joshua"    "504" "Jack"      "488" "Jack"    "534"
[2,] "Jack"      "491" "Joshua"    "386" "Joshua"  "406"
[3,] "Benjamin"  "370" "Samuel"    "340" "Daniel"  "370"
[4,] "Samuel"    "357" "Daniel"    "321" "James"   "356"
```

```
[5,] "Ethan"    "351" "James"    "318" "William" "332"
[6,] "Matthew"  "329" "Benjamin" "297" "Samuel"  "320"
> datbit
     V4          V5
[1,] "Joshua"   "504"
[2,] "Jack"     "491"
[3,] "Benjamin" "370"
[4,] "Samuel"   "357"
[5,] "Ethan"    "351"
[6,] "Matthew"  "329"
> plist
Name  No.
   3    4
> matData
     V4          V5    V7          V8    V10       V11
[1,] "Joshua"   "504" "Jack"     "488" "Jack"    "534"
[2,] "Jack"     "491" "Joshua"   "386" "Joshua"  "406"
[3,] "Benjamin" "370" "Samuel"   "340" "Daniel"  "370"
[4,] "Samuel"   "357" "Daniel"   "321" "James"   "356"
[5,] "Ethan"    "351" "James"    "318" "William" "332"
[6,] "Matthew"  "329" "Benjamin" "297" "Samuel"  "320"
> datbit
     V7          V8
[1,] "Jack"     "488"
[2,] "Joshua"   "386"
[3,] "Samuel"   "340"
[4,] "Daniel"   "321"
[5,] "James"    "318"
[6,] "Benjamin" "297"
> plist
Name  No.
   5    6
> matData
     V4          V5    V7          V8    V10       V11
[1,] "Joshua"   "504" "Jack"     "488" "Jack"    "534"
[2,] "Jack"     "491" "Joshua"   "386" "Joshua"  "406"
[3,] "Benjamin" "370" "Samuel"   "340" "Daniel"  "370"
[4,] "Samuel"   "357" "Daniel"   "321" "James"   "356"
[5,] "Ethan"    "351" "James"    "318" "William" "332"
[6,] "Matthew"  "329" "Benjamin" "297" "Samuel"  "320"
> datbit
     V10       V11
[1,] "Jack"    "534"
[2,] "Joshua"  "406"
[3,] "Daniel"  "370"
[4,] "James"   "356"
[5,] "William" "332"
[6,] "Samuel"  "320"
> plist
Name  No.
   7    8
> matData
     V4          V5    V7          V8    V10       V11
[1,] "Joshua"   "504" "Jack"     "488" "Jack"    "534"
[2,] "Jack"     "491" "Joshua"   "386" "Joshua"  "406"
[3,] "Benjamin" "370" "Samuel"   "340" "Daniel"  "370"
[4,] "Samuel"   "357" "Daniel"   "321" "James"   "356"
```

```
[5,] "Ethan"    "351" "James"    "318" "William" "332"
[6,] "Matthew"  "329" "Benjamin" "297" "Samuel"  "320"
> datbit
     V13       V14
[1,] "Jack"    "499"
[2,] "James"   "369"
[3,] "Joshua"  "366"
[4,] "Daniel"  "351"
[5,] "William" "324"
[6,] "Oliver"  "319"
> plist
Name  No.
   9   10
> matData
     V4          V5    V7          V8    V10       V11
[1,] "Joshua"    "504" "Jack"     "488" "Jack"    "534"
[2,] "Jack"      "491" "Joshua"   "386" "Joshua"  "406"
[3,] "Benjamin" "370" "Samuel"   "340" "Daniel"  "370"
[4,] "Samuel"    "357" "Daniel"   "321" "James"   "356"
[5,] "Ethan"     "351" "James"    "318" "William" "332"
[6,] "Matthew"   "329" "Benjamin" "297" "Samuel"  "320"
> datbit
     V16       V17
[1,] "Jack"    "449"
[2,] "James"   "378"
[3,] "William" "352"
[4,] "Samuel"  "346"
[5,] "Joshua"  "332"
[6,] "Riley"   "328"
> plist
Name  No.
  11   12
> matData
     V4          V5    V7          V8    V10       V11
[1,] "Joshua"    "504" "Jack"     "488" "Jack"    "534"
[2,] "Jack"      "491" "Joshua"   "386" "Joshua"  "406"
[3,] "Benjamin" "370" "Samuel"   "340" "Daniel"  "370"
[4,] "Samuel"    "357" "Daniel"   "321" "James"   "356"
[5,] "Ethan"     "351" "James"    "318" "William" "332"
[6,] "Matthew"   "329" "Benjamin" "297" "Samuel"  "320"
> datbit
     V19       V20
[1,] "Jack"    "345"
[2,] "Oliver"  "342"
[3,] "James"   "337"
[4,] "Joshua"  "327"
[5,] "William" "326"
[6,] "Samuel"  "313"
> plist
Name  No.
  13   14
> matData
     V4          V5    V7          V8    V10       V11
[1,] "Joshua"    "504" "Jack"     "488" "Jack"    "534"
[2,] "Jack"      "491" "Joshua"   "386" "Joshua"  "406"
[3,] "Benjamin" "370" "Samuel"   "340" "Daniel"  "370"
[4,] "Samuel"    "357" "Daniel"   "321" "James"   "356"
```

```
[5,] "Ethan"    "351" "James"    "318" "William" "332"
[6,] "Matthew"  "329" "Benjamin" "297" "Samuel"  "320"
> datbit
     V22       V23
[1,] "Liam"    "374"
[2,] "James"   "333"
[3,] "Oliver"  "327"
[4,] "Jack"    "325"
[5,] "William" "320"
[6,] "Joshua"  "298"
> plist
Name  No.
  15   16
> matData
     V4          V5    V7          V8    V10       V11
[1,] "Joshua"    "504" "Jack"      "488" "Jack"    "534"
[2,] "Jack"      "491" "Joshua"    "386" "Joshua"  "406"
[3,] "Benjamin" "370" "Samuel"    "340" "Daniel"  "370"
[4,] "Samuel"    "357" "Daniel"    "321" "James"   "356"
[5,] "Ethan"     "351" "James"     "318" "William" "332"
[6,] "Matthew"   "329" "Benjamin" "297" "Samuel"  "320"
> datbit
     V25       V26
[1,] "Liam"    "315"
[2,] "Joshua"  "292"
[3,] "Oliver"  "286"
[4,] "Lucas"   "279"
[5,] "William" "272"
[6,] "Noah"    "271"
> colplist
$`2004`
+ Name (1, 5)
+ No. (2, 5)

$`2005`
+ Name (3, 5)
+ No. (4, 5)

$`2006`
+ Name (5, 5)
+ No. (6, 5)

$`2007`
+ Name (7, 5)
+ No. (8, 5)

$`2008`
+ Name (9, 5)
+ No. (10, 5)

$`2009`
+ Name (11, 5)
+ No. (12, 5)

> res
  UNKNOWN UNKNOWN     Name No.
1    2004       1   Joshua 504
```

```
2    2004       2     Jack 491
3    2004       3 Benjamin 370
4    2004       4   Samuel 357
5    2004       5    Ethan 351
6    2004       6  Matthew 329
```

8.2 DIATop100BabyGirlsNames2011.xls

	1	2	3	4	5	6	7	8	9	10	11	12	13
1	Table 1												
2	Top 100 Baby Girls' Names in New Zealand												
3	December 2004–2011 Years												
4													
5	Rank		2,004			2,005			2,006			2,007	
6			Name		No.	Name		No.	Name		No.	Name	
7													
8		1		Emma	352		Emma	315		Charlotte	324		Ella
9		2		Charlotte	330		Ella	292		Ella	320		Sophie
10		3		Ella	306		Charlotte	278		Sophie	295		Olivia
11		4		Sophie	299		Olivia	274		Emma	286		Emma
12		5		Hannah	286		Jessica	257		Olivia	278		Charlotte
13		6		Emily	282		Sophie	254		Emily	277		Emily
14		7		Jessica	282		Grace	248		Grace	262		Lily
15		8		Olivia	275		Hannah	223		Jessica	261		Grace
16		9		Grace	261		Emily	216		Hannah	254		Hannah
17		10		Isabella	206		Isabella	180		Lily	234		Isabella
18		11		Georgia	201		Paige	180		Isabella	224		Jessica
19		12		Samantha	196		Ruby	180		Lucy	194		Ruby
20		13		Brooke	192		Lucy	174		Chloe	190		Amelia
21		14		Lucy	190		Lily	169		Ruby	174		Lucy
22		15		Paige	187		Maia	168		Georgia	168		Madison
23		16		Lily	181		Brooke	162		Paige	167		Chloe
24		17		Sarah	161		Georgia	162		Amelia	164		Brooke
25		18		Holly	160		Holly	160		Maia	161		Ava
26		19		Chloe	154		Chloe	150		Zoe	161		Mia
27		20		Ruby	143		Amelia	146		Madison	157		Paige
28		21		Madison	142		Samantha	141		Brooke	154		Zoe
29		22		Amelia	140		Jade	137		Holly	150		Holly
30		23		Zoe	132		Sarah	135		Samantha	150		Kate
31		24		Mia	131		Kate	134		Sarah	149		Caitlin
32		25		Caitlin	124		Caitlin	130		Mia	143		Maia
33		26		Kate	123		Zoe	122		Ava	142		Georgia
34		27		Jade	118		Madison	121		Jasmine	132		Samantha
35		28		Maia	118		Amy	119		Kate	123		Sophia
36		29		Amy	116		Mia	119		Hayley	122		Sienna
37		30		Jasmine	114		Jasmine	118		Caitlin	121		Jade
38		31		Amber	106		Hayley	114		Jade	114		Amber
39		32		Hayley	102		Amber	99		Sophia	105		Maddison
40		33		Molly	102		Anna	95		Amber	103		Sarah
41		34		Sophia	101		Katie	92		Eva	102		Hayley
42		35		Paris	100		Sophia	91		Molly	100		Amy
43		36		Danielle	99		Molly	89		Amy	96		Summer

```
> rowData
[1]   8 107
> colData
[1]  2 26
> rowslist
$label
[1] 1 2 3 5 6

$data
  [1]   8   9  10  11  12  13  14  15  16  17  18  19  20  21  22  23  24  25
 [19]  26  27  28  29  30  31  32  33  34  35  36  37  38  39  40  41  42  43
 [37]  44  45  46  47  48  49  50  51  52  53  54  55  56  57  58  59  60  61
 [55]  62  63  64  65  66  67  68  69  70  71  72  73  74  75  76  77  78  79
 [73]  80  81  82  83  84  85  86  87  88  89  90  91  92  93  94  95  96  97
 [91]  98  99 100 101 102 103 104 105 106 107

> colslist
$label
[1] 1

$data
 [1]  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26

> plist
$rows
  [1]   1   2   3   4   5   6   7   8   9  10  11  12  13  14  15  16  17  18
```

```
 [19]  19  20  21  22  23  24  25  26  27  28  29  30  31  32  33  34  35  36
 [37]  37  38  39  40  41  42  43  44  45  46  47  48  49  50  51  52  53  54
 [55]  55  56  57  58  59  60  61  62  63  64  65  66  67  68  69  70  71  72
 [73]  73  74  75  76  77  78  79  80  81  82  83  84  85  86  87  88  89  90
 [91]  91  92  93  94  95  96  97  98  99 100

$cols
[1] 1

> res
  1   2   3   4   5   6
  1   2   3   4   5   6
> rowplist
  1   2   3   4   5   6
  1   2   3   4   5   6
> rowvecs
     [,1]
[1,] "  1"
[2,] "  2"
[3,] "  3"
[4,] "  4"
[5,] "  5"
[6,] "  6"
> matColLabel
     V3     V5     V6     V8     V9     V11
[1,] NA     NA     NA     NA     NA     NA
[2,] NA     NA     NA     NA     NA     NA
[3,] NA     NA     NA     NA     NA     NA
[4,] "2004" NA     "2005" NA     "2006" NA
[5,] "Name" "No." "Name" "No." "Name" "No."
> cursub
    V3     V5
"2004"     NA
> currow[curcols]
    V3     V5
"2004"     NA
> cursub
    V6     V8
"2005"     NA
> currow[curcols]
    V6     V8
"2005"     NA
> cursub
    V9    V11
"2006"     NA
> currow[curcols]
    V9    V11
"2006"     NA
> cursub
   V12    V14
"2007"     NA
> currow[curcols]
   V12    V14
"2007"     NA
> cursub
   V15    V17
"2008"     NA
```

```
> currow[curcols]
   V15    V17
"2008"     NA
> cursub
   V18    V20
"2009"     NA
> currow[curcols]
   V18    V20
"2009"     NA
> cursub
   V21    V23
"2010"     NA
> currow[curcols]
   V21    V23
"2010"     NA
> cursub
   V24    V26
"2011"     NA
> currow[curcols]
   V24    V26
"2011"     NA
> cursub
    V3     V5
"Name"  "No."
> currow[curcols]
    V3     V5
"Name"  "No."
> cursub
    V6     V8
"Name"  "No."
> currow[curcols]
    V6     V8
"Name"  "No."
> cursub
    V9    V11
"Name"  "No."
> currow[curcols]
    V9    V11
"Name"  "No."
> cursub
   V12    V14
"Name"  "No."
> currow[curcols]
   V12    V14
"Name"  "No."
> cursub
   V15    V17
"Name"  "No."
> currow[curcols]
   V15    V17
"Name"  "No."
> cursub
   V18    V20
"Name"  "No."
> currow[curcols]
   V18    V20
"Name"  "No."
```

```
> cursub
   V21    V23
"Name"  "No."
> currow[curcols]
   V21    V23
"Name"  "No."
> cursub
   V24    V26
"Name"  "No."
> currow[curcols]
   V24    V26
"Name"  "No."
> matColLabel
     V3     V5    V6     V8    V9     V11
[1,] NA     NA    NA     NA    NA     NA
[2,] NA     NA    NA     NA    NA     NA
[3,] NA     NA    NA     NA    NA     NA
[4,] "2004" NA    "2005" NA    "2006" NA
[5,] "Name" "No." "Name" "No." "Name" "No."
> matColLabel
     V3     V5    V6     V8    V9     V11
[1,] NA     NA    NA     NA    NA     NA
[2,] NA     NA    NA     NA    NA     NA
[3,] NA     NA    NA     NA    NA     NA
[4,] "2004" NA    "2005" NA    "2006" NA
[5,] "Name" "No." "Name" "No." "Name" "No."
> matColLabel
     V3     V5    V6     V8    V9     V11
[1,] NA     NA    NA     NA    NA     NA
[2,] NA     NA    NA     NA    NA     NA
[3,] NA     NA    NA     NA    NA     NA
[4,] "2004" NA    "2005" NA    "2006" NA
[5,] "Name" "No." "Name" "No." "Name" "No."
> res
$`2004`
$`2004`$rows
[1] 1 2

$`2004`$cols
[1] 5


$`2005`
$`2005`$rows
[1] 3 4

$`2005`$cols
[1] 5


$`2006`
$`2006`$rows
[1] 5 6

$`2006`$cols
[1] 5
```

```
$‘2007‘
$‘2007‘$rows
[1] 7 8

$‘2007‘$cols
[1] 5


$‘2008‘
$‘2008‘$rows
[1]  9 10

$‘2008‘$cols
[1] 5


$‘2009‘
$‘2009‘$rows
[1] 11 12

$‘2009‘$cols
[1] 5


> plist
$rows
[1] 1 2

$cols
[1] 5

> res
Name  No.
   1    2
> plist
$rows
[1] 3 4

$cols
[1] 5

> res
Name  No.
   3    4
> plist
$rows
[1] 5 6

$cols
[1] 5

> res
Name  No.
   5    6
> plist
$rows
```

```
[1] 7 8

$cols
[1] 5

> res
Name  No.
   7    8
> plist
$rows
[1]  9 10

$cols
[1] 5

> res
Name  No.
   9   10
> plist
$rows
[1] 11 12

$cols
[1] 5

> res
Name  No.
  11   12
> plist
$rows
[1] 13 14

$cols
[1] 5

> res
Name  No.
  13   14
> plist
$rows
[1] 15 16

$cols
[1] 5

> res
Name  No.
  15   16
> plist
Name  No.
   1    2
> matData
     V4          V5    V7          V8    V10         V11
[1,] "Emma"      "352" "Emma"      "315" "Charlotte" "324"
[2,] "Charlotte" "330" "Ella"      "292" "Ella"      "320"
[3,] "Ella"      "306" "Charlotte" "278" "Sophie"    "295"
[4,] "Sophie"    "299" "Olivia"    "274" "Emma"      "286"
```

```
[5,] "Hannah"    "286" "Jessica"   "257" "Olivia"    "278"
[6,] "Emily"     "282" "Sophie"    "254" "Emily"     "277"
> datbit
     V4          V5
[1,] "Emma"      "352"
[2,] "Charlotte" "330"
[3,] "Ella"      "306"
[4,] "Sophie"    "299"
[5,] "Hannah"    "286"
[6,] "Emily"     "282"
> plist
Name  No.
   3    4
> matData
     V4          V5    V7          V8    V10         V11
[1,] "Emma"      "352" "Emma"      "315" "Charlotte" "324"
[2,] "Charlotte" "330" "Ella"      "292" "Ella"      "320"
[3,] "Ella"      "306" "Charlotte" "278" "Sophie"    "295"
[4,] "Sophie"    "299" "Olivia"    "274" "Emma"      "286"
[5,] "Hannah"    "286" "Jessica"   "257" "Olivia"    "278"
[6,] "Emily"     "282" "Sophie"    "254" "Emily"     "277"
> datbit
     V7          V8
[1,] "Emma"      "315"
[2,] "Ella"      "292"
[3,] "Charlotte" "278"
[4,] "Olivia"    "274"
[5,] "Jessica"   "257"
[6,] "Sophie"    "254"
> plist
Name  No.
   5    6
> matData
     V4          V5    V7          V8    V10         V11
[1,] "Emma"      "352" "Emma"      "315" "Charlotte" "324"
[2,] "Charlotte" "330" "Ella"      "292" "Ella"      "320"
[3,] "Ella"      "306" "Charlotte" "278" "Sophie"    "295"
[4,] "Sophie"    "299" "Olivia"    "274" "Emma"      "286"
[5,] "Hannah"    "286" "Jessica"   "257" "Olivia"    "278"
[6,] "Emily"     "282" "Sophie"    "254" "Emily"     "277"
> datbit
     V10         V11
[1,] "Charlotte" "324"
[2,] "Ella"      "320"
[3,] "Sophie"    "295"
[4,] "Emma"      "286"
[5,] "Olivia"    "278"
[6,] "Emily"     "277"
> plist
Name  No.
   7    8
> matData
     V4          V5    V7          V8    V10         V11
[1,] "Emma"      "352" "Emma"      "315" "Charlotte" "324"
[2,] "Charlotte" "330" "Ella"      "292" "Ella"      "320"
[3,] "Ella"      "306" "Charlotte" "278" "Sophie"    "295"
[4,] "Sophie"    "299" "Olivia"    "274" "Emma"      "286"
```

```
[5,] "Hannah"    "286" "Jessica"   "257" "Olivia"    "278"
[6,] "Emily"     "282" "Sophie"    "254" "Emily"     "277"
> datbit
     V13         V14
[1,] "Ella"      "418"
[2,] "Sophie"    "351"
[3,] "Olivia"    "285"
[4,] "Emma"      "280"
[5,] "Charlotte" "263"
[6,] "Emily"     "258"
> plist
Name  No.
   9   10
> matData
     V4          V5    V7          V8    V10         V11
[1,] "Emma"      "352" "Emma"      "315" "Charlotte" "324"
[2,] "Charlotte" "330" "Ella"      "292" "Ella"      "320"
[3,] "Ella"      "306" "Charlotte" "278" "Sophie"    "295"
[4,] "Sophie"    "299" "Olivia"    "274" "Emma"      "286"
[5,] "Hannah"    "286" "Jessica"   "257" "Olivia"    "278"
[6,] "Emily"     "282" "Sophie"    "254" "Emily"     "277"
> datbit
     V16         V17
[1,] "Sophie"    "356"
[2,] "Olivia"    "308"
[3,] "Ella"      "297"
[4,] "Isabella"  "288"
[5,] "Charlotte" "269"
[6,] "Lily"      "254"
> plist
Name  No.
  11   12
> matData
     V4          V5    V7          V8    V10         V11
[1,] "Emma"      "352" "Emma"      "315" "Charlotte" "324"
[2,] "Charlotte" "330" "Ella"      "292" "Ella"      "320"
[3,] "Ella"      "306" "Charlotte" "278" "Sophie"    "295"
[4,] "Sophie"    "299" "Olivia"    "274" "Emma"      "286"
[5,] "Hannah"    "286" "Jessica"   "257" "Olivia"    "278"
[6,] "Emily"     "282" "Sophie"    "254" "Emily"     "277"
> datbit
     V19        V20
[1,] "Sophie"   "386"
[2,] "Ruby"     "305"
[3,] "Olivia"   "304"
[4,] "Isabella" "288"
[5,] "Ella"     "283"
[6,] "Emily"    "266"
> plist
Name  No.
  13   14
> matData
     V4          V5    V7          V8    V10         V11
[1,] "Emma"      "352" "Emma"      "315" "Charlotte" "324"
[2,] "Charlotte" "330" "Ella"      "292" "Ella"      "320"
[3,] "Ella"      "306" "Charlotte" "278" "Sophie"    "295"
[4,] "Sophie"    "299" "Olivia"    "274" "Emma"      "286"
```

```
[5,] "Hannah"    "286" "Jessica"   "257" "Olivia"    "278"
[6,] "Emily"     "282" "Sophie"    "254" "Emily"     "277"
> datbit
     V22         V23
[1,] "Sophie"    "377"
[2,] "Olivia"    "335"
[3,] "Ruby"      "322"
[4,] "Charlotte" "305"
[5,] "Isabella"  "286"
[6,] "Lily"      "281"
> plist
Name  No.
  15   16
> matData
     V4          V5    V7          V8    V10         V11
[1,] "Emma"      "352" "Emma"      "315" "Charlotte" "324"
[2,] "Charlotte" "330" "Ella"      "292" "Ella"      "320"
[3,] "Ella"      "306" "Charlotte" "278" "Sophie"    "295"
[4,] "Sophie"    "299" "Olivia"    "274" "Emma"      "286"
[5,] "Hannah"    "286" "Jessica"   "257" "Olivia"    "278"
[6,] "Emily"     "282" "Sophie"    "254" "Emily"     "277"
> datbit
     V25         V26
[1,] "Ruby"      "335"
[2,] "Olivia"    "324"
[3,] "Sophie"    "309"
[4,] "Isabella"  "277"
[5,] "Charlotte" "258"
[6,] "Grace"     "246"
> colplist
$`2004`
+ Name (1, 5)
+ No. (2, 5)

$`2005`
+ Name (3, 5)
+ No. (4, 5)

$`2006`
+ Name (5, 5)
+ No. (6, 5)

$`2007`
+ Name (7, 5)
+ No. (8, 5)

$`2008`
+ Name (9, 5)
+ No. (10, 5)

$`2009`
+ Name (11, 5)
+ No. (12, 5)

> res
  UNKNOWN UNKNOWN      Name No.
1    2004       1      Emma 352
```

```
2    2004       2 Charlotte 330
3    2004       3      Ella 306
4    2004       4    Sophie 299
5    2004       5    Hannah 286
6    2004       6     Emily 282
```

8.3 NZQAScholarships.xls

	1	2	3	4	5	6	7	8	9	10	11	12	13
1	Scholarship Entries and Results by Gender and Ethnicity (Broken down by Decile)												
2													
3				Decile 1–3									Decile 4–7
4			# of	#	#		#	# Not	#	#		# of	#
5	Results		Entries	Absent	SNA		Assessed	Achieved	Scholarship	Outstanding		Entries	Absent
6													
7	All Subjects		714	148	13		553	462	81	10		6,482	1,772
8													
9	Accounting		22	4	0		18	16	2	0		156	41
10	NZ Maori	Male	2	1	0		1	1	0	0		2	1
11		Female	0	0	0		0	0	0	0		7	2
12	NZ Europea	Male	2	0	0		2	1	1	0		51	13
13		Female	3	0	0		3	2	1	0		44	12
14		Unknown	0	0	0		0	0	0	0		0	0
15	Pasifika Pe	Male	2	0	0		2	2	0	0		3	0
16		Female	6	2	0		4	4	0	0		4	2
17	Asian	Male	5	0	0		5	5	0	0		29	4
18		Female	2	1	0		1	1	0	0		15	7
19	Other/Unsp	Male	0	0	0		0	0	0	0		0	0
20		Female	0	0	0		0	0	0	0		1	0
21													
22	Agricultural & Horticultu		0	0	0		0	0	0	0		15	3
23	NZ Maori	Male	0	0	0		0	0	0	0		0	0
24		Female	0	0	0		0	0	0	0		0	0
25	NZ Europea	Male	0	0	0		0	0	0	0		10	1
26		Female	0	0	0		0	0	0	0		5	2
27		Unknown	0	0	0		0	0	0	0		0	0
28	Pasifika Pe	Male	0	0	0		0	0	0	0		0	0
29		Female	0	0	0		0	0	0	0		0	0
30	Asian	Male	0	0	0		0	0	0	0		0	0
31		Female	0	0	0		0	0	0	0		0	0
32	Other/Unsp	Male	0	0	0		0	0	0	0		0	0
33		Female	0	0	0		0	0	0	0		0	0
34													
35	Art History		6	1	0		5	5	0	0		87	23
36	NZ Maori	Male	0	0	0		0	0	0	0		1	0
37		Female	2	0	0		2	2	0	0		4	1
38	NZ Europea	Male	1	1	0		0	0	0	0		7	2
39		Female	3	0	0		3	3	0	0		60	17
40		Unknown	0	0	0		0	0	0	0		0	0
41	Pasifika Pe	Male	0	0	0		0	0	0	0		0	0
42		Female	0	0	0		0	0	0	0		0	0
43	Asian	Male	0	0	0		0	0	0	0		3	0

```
> rowData
[1]   7 462
> colData
[1]  3 28
> rowslist
$label
[1] 1 3 4 5

$data
  [1]   7   9  10  11  12  13  14  15  16  17  18  19  20  22  23  24  25  26
 [19]  27  28  29  30  31  32  33  35  36  37  38  39  40  41  42  43  44  45
 [37]  46  48  49  50  51  52  53  54  55  56  57  58  59  61  62  63  64  65
 [55]  66  67  68  69  70  71  72  74  75  76  77  78  79  80  81  82  83  84
 [73]  85  87  88  89  90  91  92  93  94  95  96  97  98 100 101 102 103 104
 [91] 105 106 107 108 109 110 111 113 114 115 116 117 118 119 120 121 122 123
[109] 124 126 127 128 129 130 131 132 133 134 135 136 137 139 140 141 142 143
[127] 144 145 146 147 148 149 150 152 153 154 155 156 157 158 159 160 161 162
[145] 163 165 166 167 168 169 170 171 172 173 174 175 176 178 179 180 181 182
[163] 183 184 185 186 187 188 189 191 192 193 194 195 196 197 198 199 200 201
[181] 202 204 205 206 207 208 209 210 211 212 213 214 215 217 218 219 220 221
[199] 222 223 224 225 226 227 228 230 231 232 233 234 235 236 237 238 239 240
[217] 241 243 244 245 246 247 248 249 250 251 252 253 254 256 257 258 259 260
[235] 261 262 263 264 265 266 267 269 270 271 272 273 274 275 276 277 278 279
[253] 280 282 283 284 285 286 287 288 289 290 291 292 293 295 296 297 298 299
[271] 300 301 302 303 304 305 306 308 309 310 311 312 313 314 315 316 317 318
[289] 319 321 322 323 324 325 326 327 328 329 330 331 332 334 335 336 337 338
```

```
[307] 339 340 341 342 343 344 345 347 348 349 350 351 352 353 354 355 356 357
[325] 358 360 361 362 363 364 365 366 367 368 369 370 371 373 374 375 376 377
[343] 378 379 380 381 382 383 384 386 387 388 389 390 391 392 393 394 395 396
[361] 397 399 400 401 402 403 404 405 406 407 408 409 410 412 413 414 415 416
[379] 417 418 419 420 421 422 423 425 426 427 428 429 430 431 432 433 434 435
[397] 436 438 439 440 441 442 443 444 445 446 447 448 449 451 452 453 454 455
[415] 456 457 458 459 460 461 462

> colslist
$label
[1] 1 2

$data
 [1]  3  4  5  7  8  9 10 12 13 14 16 17 18 19 21 22 23 25 26 27 28

> res
$`All Subjects`
$`All Subjects`$rows
  [1]   2   3   4   5   6   7   8   9  10  11  12  13  14  15  16  17  18  19
 [19]  20  21  22  23  24  25  26  27  28  29  30  31  32  33  34  35  36  37
 [37]  38  39  40  41  42  43  44  45  46  47  48  49  50  51  52  53  54  55
 [55]  56  57  58  59  60  61  62  63  64  65  66  67  68  69  70  71  72  73
 [73]  74  75  76  77  78  79  80  81  82  83  84  85  86  87  88  89  90  91
 [91]  92  93  94  95  96  97  98  99 100 101 102 103 104 105 106 107 108 109
[109] 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127
[127] 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145
[145] 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163
[163] 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181
[181] 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199
[199] 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217
[217] 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235
[235] 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253
[253] 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271
[271] 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289
[289] 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307
[307] 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325
[325] 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343
[343] 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361
[361] 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379
[379] 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397
[397] 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415
[415] 416 417 418 419 420 421

$`All Subjects`$cols
[1] 1 2


> res
$Accounting
$Accounting$rows
 [1]  3  4  5  6  7  8  9 10 11 12 13

$Accounting$cols
[1] 1 2


$`Agricultural & Horticultural Science`
```

```
$‘Agricultural & Horticultural Science‘$rows
 [1] 15 16 17 18 19 20 21 22 23 24 25

$‘Agricultural & Horticultural Science‘$cols
[1] 1 2


$‘Art History‘
$‘Art History‘$rows
 [1] 27 28 29 30 31 32 33 34 35 36 37

$‘Art History‘$cols
[1] 1 2


$Biology
$Biology$rows
 [1] 39 40 41 42 43 44 45 46 47 48 49

$Biology$cols
[1] 1 2


$Chemistry
$Chemistry$rows
 [1] 51 52 53 54 55 56 57 58 59 60 61

$Chemistry$cols
[1] 1 2


$Chinese
$Chinese$rows
 [1] 63 64 65 66 67 68 69 70 71 72 73

$Chinese$cols
[1] 1 2


> res
$‘NZ Maori‘
$‘NZ Maori‘$rows
[1] 3 4

$‘NZ Maori‘$cols
[1] 2


$‘NZ European‘
$‘NZ European‘$rows
[1] 5 6 7

$‘NZ European‘$cols
[1] 2


$‘Pasifika Peoples‘
```

```
$‘Pasifika Peoples‘$rows
[1] 8 9

$‘Pasifika Peoples‘$cols
[1] 2


$Asian
$Asian$rows
[1] 10 11

$Asian$cols
[1] 2


$‘Other/Unspecified Ethnicity‘
$‘Other/Unspecified Ethnicity‘$rows
[1] 12 13

$‘Other/Unspecified Ethnicity‘$cols
[1] 2


> plist
$rows
[1] 3 4

$cols
[1] 2

> res
  Male Female
     3      4
> plist
$rows
[1] 5 6 7

$cols
[1] 2

> res
   Male  Female Unknown
      5       6       7
> plist
$rows
[1] 8 9

$cols
[1] 2

> res
  Male Female
     8      9
> plist
$rows
[1] 10 11
```

```
$cols
[1] 2

> res
  Male Female
    10     11
> plist
$rows
[1] 12 13

$cols
[1] 2

> res
  Male Female
    12     13
> res
$`NZ Maori`
$`NZ Maori`$rows
[1] 15 16

$`NZ Maori`$cols
[1] 2


$`NZ European`
$`NZ European`$rows
[1] 17 18 19

$`NZ European`$cols
[1] 2


$`Pasifika Peoples`
$`Pasifika Peoples`$rows
[1] 20 21

$`Pasifika Peoples`$cols
[1] 2


$Asian
$Asian$rows
[1] 22 23

$Asian$cols
[1] 2


$`Other/Unspecified Ethnicity`
$`Other/Unspecified Ethnicity`$rows
[1] 24 25

$`Other/Unspecified Ethnicity`$cols
[1] 2
```

```
> plist
$rows
[1] 15 16

$cols
[1] 2

> res
  Male Female
    15     16
> plist
$rows
[1] 17 18 19

$cols
[1] 2

> res
   Male  Female Unknown
     17      18      19
> plist
$rows
[1] 20 21

$cols
[1] 2

> res
  Male Female
    20     21
> plist
$rows
[1] 22 23

$cols
[1] 2

> res
  Male Female
    22     23
> plist
$rows
[1] 24 25

$cols
[1] 2

> res
  Male Female
    24     25
> res
$`NZ Maori`
$`NZ Maori`$rows
[1] 27 28

$`NZ Maori`$cols
[1] 2
```

```
$‘NZ European‘
$‘NZ European‘$rows
[1] 29 30 31

$‘NZ European‘$cols
[1] 2


$‘Pasifika Peoples‘
$‘Pasifika Peoples‘$rows
[1] 32 33

$‘Pasifika Peoples‘$cols
[1] 2


$Asian
$Asian$rows
[1] 34 35

$Asian$cols
[1] 2


$‘Other/Unspecified Ethnicity‘
$‘Other/Unspecified Ethnicity‘$rows
[1] 36 37

$‘Other/Unspecified Ethnicity‘$cols
[1] 2


> plist
$rows
[1] 27 28

$cols
[1] 2

> res
  Male Female
    27     28
> plist
$rows
[1] 29 30 31

$cols
[1] 2

> res
   Male  Female Unknown
     29      30      31
> plist
$rows
[1] 32 33
```

```
$cols
[1] 2

> res
  Male Female
    32     33
> plist
$rows
[1] 34 35

$cols
[1] 2

> res
  Male Female
    34     35
> plist
$rows
[1] 36 37

$cols
[1] 2

> res
  Male Female
    36     37
> res
$`NZ Maori`
$`NZ Maori`$rows
[1] 39 40

$`NZ Maori`$cols
[1] 2


$`NZ European`
$`NZ European`$rows
[1] 41 42 43

$`NZ European`$cols
[1] 2


$`Pasifika Peoples`
$`Pasifika Peoples`$rows
[1] 44 45

$`Pasifika Peoples`$cols
[1] 2


$Asian
$Asian$rows
[1] 46 47

$Asian$cols
```

```
[1] 2


$`Other/Unspecified Ethnicity`
$`Other/Unspecified Ethnicity`$rows
[1] 48 49

$`Other/Unspecified Ethnicity`$cols
[1] 2


> plist
$rows
[1] 39 40

$cols
[1] 2

> res
  Male Female
    39     40
> plist
$rows
[1] 41 42 43

$cols
[1] 2

> res
   Male  Female Unknown
     41      42      43
> plist
$rows
[1] 44 45

$cols
[1] 2

> res
  Male Female
    44     45
> plist
$rows
[1] 46 47

$cols
[1] 2

> res
  Male Female
    46     47
> plist
$rows
[1] 48 49

$cols
[1] 2
```

```
> res
  Male Female
    48     49
> res
$`NZ Maori`
$`NZ Maori`$rows
[1] 51 52

$`NZ Maori`$cols
[1] 2


$`NZ European`
$`NZ European`$rows
[1] 53 54 55

$`NZ European`$cols
[1] 2


$`Pasifika Peoples`
$`Pasifika Peoples`$rows
[1] 56 57

$`Pasifika Peoples`$cols
[1] 2


$Asian
$Asian$rows
[1] 58 59

$Asian$cols
[1] 2


$`Other/Unspecified Ethnicity`
$`Other/Unspecified Ethnicity`$rows
[1] 60 61

$`Other/Unspecified Ethnicity`$cols
[1] 2


> plist
$rows
[1] 51 52

$cols
[1] 2

> res
  Male Female
    51     52
> plist
$rows
```

```
[1] 53 54 55

$cols
[1] 2

> res
   Male  Female Unknown
     53      54      55
> plist
$rows
[1] 56 57

$cols
[1] 2

> res
  Male Female
    56     57
> plist
$rows
[1] 58 59

$cols
[1] 2

> res
  Male Female
    58     59
> plist
$rows
[1] 60 61

$cols
[1] 2

> res
  Male Female
    60     61
> res
$`NZ Maori`
$`NZ Maori`$rows
[1] 63 64

$`NZ Maori`$cols
[1] 2


$`NZ European`
$`NZ European`$rows
[1] 65 66 67

$`NZ European`$cols
[1] 2


$`Pasifika Peoples`
$`Pasifika Peoples`$rows
```

```
[1] 68 69

$‘Pasifika Peoples‘$cols
[1] 2


$Asian
$Asian$rows
[1] 70 71

$Asian$cols
[1] 2


$‘Other/Unspecified Ethnicity‘
$‘Other/Unspecified Ethnicity‘$rows
[1] 72 73

$‘Other/Unspecified Ethnicity‘$cols
[1] 2


> plist
$rows
[1] 63 64

$cols
[1] 2

> res
  Male Female
    63     64
> plist
$rows
[1] 65 66 67

$cols
[1] 2

> res
   Male  Female Unknown
     65      66      67
> plist
$rows
[1] 68 69

$cols
[1] 2

> res
  Male Female
    68     69
> plist
$rows
[1] 70 71

$cols
```

```
[1] 2

> res
  Male Female
    70     71
> plist
$rows
[1] 72 73

$cols
[1] 2

> res
  Male Female
    72     73
> res
$`NZ Maori`
$`NZ Maori`$rows
[1] 75 76

$`NZ Maori`$cols
[1] 2


$`NZ European`
$`NZ European`$rows
[1] 77 78 79

$`NZ European`$cols
[1] 2


$`Pasifika Peoples`
$`Pasifika Peoples`$rows
[1] 80 81

$`Pasifika Peoples`$cols
[1] 2


$Asian
$Asian$rows
[1] 82 83

$Asian$cols
[1] 2


$`Other/Unspecified Ethnicity`
$`Other/Unspecified Ethnicity`$rows
[1] 84 85

$`Other/Unspecified Ethnicity`$cols
[1] 2


> plist
```

```
$rows
[1] 75 76

$cols
[1] 2

> res
  Male Female
    75     76
> plist
$rows
[1] 77 78 79

$cols
[1] 2

> res
   Male  Female Unknown
     77      78      79
> plist
$rows
[1] 80 81

$cols
[1] 2

> res
  Male Female
    80     81
> plist
$rows
[1] 82 83

$cols
[1] 2

> res
  Male Female
    82     83
> plist
$rows
[1] 84 85

$cols
[1] 2

> res
  Male Female
    84     85
> res
$`NZ Maori`
$`NZ Maori`$rows
[1] 87 88

$`NZ Maori`$cols
[1] 2
```

```
$`NZ European`
$`NZ European`$rows
[1] 89 90 91

$`NZ European`$cols
[1] 2


$`Pasifika Peoples`
$`Pasifika Peoples`$rows
[1] 92 93

$`Pasifika Peoples`$cols
[1] 2


$Asian
$Asian$rows
[1] 94 95

$Asian$cols
[1] 2


$`Other/Unspecified Ethnicity`
$`Other/Unspecified Ethnicity`$rows
[1] 96 97

$`Other/Unspecified Ethnicity`$cols
[1] 2


> plist
$rows
[1] 87 88

$cols
[1] 2

> res
  Male Female
    87     88
> plist
$rows
[1] 89 90 91

$cols
[1] 2

> res
   Male  Female Unknown
     89      90      91
> plist
$rows
[1] 92 93
```

```
$cols
[1] 2

> res
  Male Female
    92     93
> plist
$rows
[1] 94 95

$cols
[1] 2

> res
  Male Female
    94     95
> plist
$rows
[1] 96 97

$cols
[1] 2

> res
  Male Female
    96     97
> res
$`NZ Maori`
$`NZ Maori`$rows
[1]  99 100

$`NZ Maori`$cols
[1] 2


$`NZ European`
$`NZ European`$rows
[1] 101 102 103

$`NZ European`$cols
[1] 2


$`Pasifika Peoples`
$`Pasifika Peoples`$rows
[1] 104 105

$`Pasifika Peoples`$cols
[1] 2


$Asian
$Asian$rows
[1] 106 107

$Asian$cols
[1] 2
```

```
$`Other/Unspecified Ethnicity`
$`Other/Unspecified Ethnicity`$rows
[1] 108 109

$`Other/Unspecified Ethnicity`$cols
[1] 2


> plist
$rows
[1]  99 100

$cols
[1] 2

> res
  Male Female
    99    100
> plist
$rows
[1] 101 102 103

$cols
[1] 2

> res
   Male  Female Unknown
    101     102     103
> plist
$rows
[1] 104 105

$cols
[1] 2

> res
  Male Female
   104    105
> plist
$rows
[1] 106 107

$cols
[1] 2

> res
  Male Female
   106    107
> plist
$rows
[1] 108 109

$cols
[1] 2
```

```
> res
  Male Female
   108    109
> res
$`NZ Maori`
$`NZ Maori`$rows
[1] 111 112

$`NZ Maori`$cols
[1] 2


$`NZ European`
$`NZ European`$rows
[1] 113 114 115

$`NZ European`$cols
[1] 2


$`Pasifika Peoples`
$`Pasifika Peoples`$rows
[1] 116 117

$`Pasifika Peoples`$cols
[1] 2


$Asian
$Asian$rows
[1] 118 119

$Asian$cols
[1] 2


$`Other/Unspecified Ethnicity`
$`Other/Unspecified Ethnicity`$rows
[1] 120 121

$`Other/Unspecified Ethnicity`$cols
[1] 2


> plist
$rows
[1] 111 112

$cols
[1] 2

> res
  Male Female
   111    112
> plist
$rows
[1] 113 114 115
```

```
$cols
[1] 2

> res
   Male  Female Unknown
    113     114     115
> plist
$rows
[1] 116 117

$cols
[1] 2

> res
  Male Female
   116    117
> plist
$rows
[1] 118 119

$cols
[1] 2

> res
  Male Female
   118    119
> plist
$rows
[1] 120 121

$cols
[1] 2

> res
  Male Female
   120    121
> res
$`NZ Maori`
$`NZ Maori`$rows
[1] 123 124

$`NZ Maori`$cols
[1] 2


$`NZ European`
$`NZ European`$rows
[1] 125 126 127

$`NZ European`$cols
[1] 2


$`Pasifika Peoples`
$`Pasifika Peoples`$rows
[1] 128 129
```

```
$`Pasifika Peoples`$cols
[1] 2


$Asian
$Asian$rows
[1] 130 131

$Asian$cols
[1] 2


$`Other/Unspecified Ethnicity`
$`Other/Unspecified Ethnicity`$rows
[1] 132 133

$`Other/Unspecified Ethnicity`$cols
[1] 2


> plist
$rows
[1] 123 124

$cols
[1] 2

> res
  Male Female
   123    124
> plist
$rows
[1] 125 126 127

$cols
[1] 2

> res
   Male  Female Unknown
    125     126     127
> plist
$rows
[1] 128 129

$cols
[1] 2

> res
  Male Female
   128    129
> plist
$rows
[1] 130 131

$cols
[1] 2
```

```
> res
  Male Female
   130    131
> plist
$rows
[1] 132 133

$cols
[1] 2

> res
  Male Female
   132    133
> res
$`NZ Maori`
$`NZ Maori`$rows
[1] 135 136

$`NZ Maori`$cols
[1] 2


$`NZ European`
$`NZ European`$rows
[1] 137 138 139

$`NZ European`$cols
[1] 2


$`Pasifika Peoples`
$`Pasifika Peoples`$rows
[1] 140 141

$`Pasifika Peoples`$cols
[1] 2


$Asian
$Asian$rows
[1] 142 143

$Asian$cols
[1] 2


$`Other/Unspecified Ethnicity`
$`Other/Unspecified Ethnicity`$rows
[1] 144 145

$`Other/Unspecified Ethnicity`$cols
[1] 2


> plist
$rows
```

```
[1] 135 136

$cols
[1] 2

> res
  Male Female
   135    136
> plist
$rows
[1] 137 138 139

$cols
[1] 2

> res
   Male  Female Unknown
    137     138     139
> plist
$rows
[1] 140 141

$cols
[1] 2

> res
  Male Female
   140    141
> plist
$rows
[1] 142 143

$cols
[1] 2

> res
  Male Female
   142    143
> plist
$rows
[1] 144 145

$cols
[1] 2

> res
  Male Female
   144    145
> res
$`NZ Maori`
$`NZ Maori`$rows
[1] 147 148

$`NZ Maori`$cols
[1] 2
```

```
$`NZ European`
$`NZ European`$rows
[1] 149 150 151

$`NZ European`$cols
[1] 2


$`Pasifika Peoples`
$`Pasifika Peoples`$rows
[1] 152 153

$`Pasifika Peoples`$cols
[1] 2


$Asian
$Asian$rows
[1] 154 155

$Asian$cols
[1] 2


$`Other/Unspecified Ethnicity`
$`Other/Unspecified Ethnicity`$rows
[1] 156 157

$`Other/Unspecified Ethnicity`$cols
[1] 2


> plist
$rows
[1] 147 148

$cols
[1] 2

> res
  Male Female
   147    148
> plist
$rows
[1] 149 150 151

$cols
[1] 2

> res
   Male  Female Unknown
    149     150     151
> plist
$rows
[1] 152 153

$cols
```

```
[1] 2

> res
  Male Female
   152    153
> plist
$rows
[1] 154 155

$cols
[1] 2

> res
  Male Female
   154    155
> plist
$rows
[1] 156 157

$cols
[1] 2

> res
  Male Female
   156    157
> res
$`NZ Maori`
$`NZ Maori`$rows
[1] 159 160

$`NZ Maori`$cols
[1] 2


$`NZ European`
$`NZ European`$rows
[1] 161 162 163

$`NZ European`$cols
[1] 2


$`Pasifika Peoples`
$`Pasifika Peoples`$rows
[1] 164 165

$`Pasifika Peoples`$cols
[1] 2


$Asian
$Asian$rows
[1] 166 167

$Asian$cols
[1] 2
```

```
$`Other/Unspecified Ethnicity`
$`Other/Unspecified Ethnicity`$rows
[1] 168 169

$`Other/Unspecified Ethnicity`$cols
[1] 2


> plist
$rows
[1] 159 160

$cols
[1] 2

> res
  Male Female
   159    160
> plist
$rows
[1] 161 162 163

$cols
[1] 2

> res
   Male  Female Unknown
    161     162     163
> plist
$rows
[1] 164 165

$cols
[1] 2

> res
  Male Female
   164    165
> plist
$rows
[1] 166 167

$cols
[1] 2

> res
  Male Female
   166    167
> plist
$rows
[1] 168 169

$cols
[1] 2

> res
```

```
  Male Female
   168    169
> res
$`NZ Maori`
$`NZ Maori`$rows
[1] 171 172

$`NZ Maori`$cols
[1] 2


$`NZ European`
$`NZ European`$rows
[1] 173 174 175

$`NZ European`$cols
[1] 2


$`Pasifika Peoples`
$`Pasifika Peoples`$rows
[1] 176 177

$`Pasifika Peoples`$cols
[1] 2


$Asian
$Asian$rows
[1] 178 179

$Asian$cols
[1] 2


$`Other/Unspecified Ethnicity`
$`Other/Unspecified Ethnicity`$rows
[1] 180 181

$`Other/Unspecified Ethnicity`$cols
[1] 2


> plist
$rows
[1] 171 172

$cols
[1] 2

> res
  Male Female
   171    172
> plist
$rows
[1] 173 174 175
```

```
$cols
[1] 2

> res
   Male  Female Unknown
    173     174     175
> plist
$rows
[1] 176 177

$cols
[1] 2

> res
  Male Female
   176    177
> plist
$rows
[1] 178 179

$cols
[1] 2

> res
  Male Female
   178    179
> plist
$rows
[1] 180 181

$cols
[1] 2

> res
  Male Female
   180    181
> res
$`NZ Maori`
$`NZ Maori`$rows
[1] 183 184

$`NZ Maori`$cols
[1] 2


$`NZ European`
$`NZ European`$rows
[1] 185 186 187

$`NZ European`$cols
[1] 2


$`Pasifika Peoples`
$`Pasifika Peoples`$rows
[1] 188 189
```

```
$‘Pasifika Peoples‘$cols
[1] 2


$Asian
$Asian$rows
[1] 190 191

$Asian$cols
[1] 2


$‘Other/Unspecified Ethnicity‘
$‘Other/Unspecified Ethnicity‘$rows
[1] 192 193

$‘Other/Unspecified Ethnicity‘$cols
[1] 2


> plist
$rows
[1] 183 184

$cols
[1] 2

> res
  Male Female
   183    184
> plist
$rows
[1] 185 186 187

$cols
[1] 2

> res
   Male  Female Unknown
    185     186     187
> plist
$rows
[1] 188 189

$cols
[1] 2

> res
  Male Female
   188    189
> plist
$rows
[1] 190 191

$cols
[1] 2
```

```
> res
  Male Female
   190    191
> plist
$rows
[1] 192 193

$cols
[1] 2

> res
  Male Female
   192    193
> res
$`NZ Maori`
$`NZ Maori`$rows
[1] 195 196

$`NZ Maori`$cols
[1] 2


$`NZ European`
$`NZ European`$rows
[1] 197 198 199

$`NZ European`$cols
[1] 2


$`Pasifika Peoples`
$`Pasifika Peoples`$rows
[1] 200 201

$`Pasifika Peoples`$cols
[1] 2


$Asian
$Asian$rows
[1] 202 203

$Asian$cols
[1] 2


$`Other/Unspecified Ethnicity`
$`Other/Unspecified Ethnicity`$rows
[1] 204 205

$`Other/Unspecified Ethnicity`$cols
[1] 2


> plist
$rows
[1] 195 196
```

```
$cols
[1] 2

> res
  Male Female
   195    196
> plist
$rows
[1] 197 198 199

$cols
[1] 2

> res
   Male  Female Unknown
    197     198     199
> plist
$rows
[1] 200 201

$cols
[1] 2

> res
  Male Female
   200    201
> plist
$rows
[1] 202 203

$cols
[1] 2

> res
  Male Female
   202    203
> plist
$rows
[1] 204 205

$cols
[1] 2

> res
  Male Female
   204    205
> res
$`NZ Maori`
$`NZ Maori`$rows
[1] 207 208

$`NZ Maori`$cols
[1] 2


$`NZ European`
```

```
$‘NZ European‘$rows
[1] 209 210 211

$‘NZ European‘$cols
[1] 2


$‘Pasifika Peoples‘
$‘Pasifika Peoples‘$rows
[1] 212 213

$‘Pasifika Peoples‘$cols
[1] 2


$Asian
$Asian$rows
[1] 214 215

$Asian$cols
[1] 2


$‘Other/Unspecified Ethnicity‘
$‘Other/Unspecified Ethnicity‘$rows
[1] 216 217

$‘Other/Unspecified Ethnicity‘$cols
[1] 2


> plist
$rows
[1] 207 208

$cols
[1] 2

> res
  Male Female
   207    208
> plist
$rows
[1] 209 210 211

$cols
[1] 2

> res
   Male  Female Unknown
    209     210     211
> plist
$rows
[1] 212 213

$cols
[1] 2
```

```
> res
  Male Female
   212    213
> plist
$rows
[1] 214 215

$cols
[1] 2

> res
  Male Female
   214    215
> plist
$rows
[1] 216 217

$cols
[1] 2

> res
  Male Female
   216    217
> res
$`NZ Maori`
$`NZ Maori`$rows
[1] 219 220

$`NZ Maori`$cols
[1] 2


$`NZ European`
$`NZ European`$rows
[1] 221 222 223

$`NZ European`$cols
[1] 2


$`Pasifika Peoples`
$`Pasifika Peoples`$rows
[1] 224 225

$`Pasifika Peoples`$cols
[1] 2


$Asian
$Asian$rows
[1] 226 227

$Asian$cols
[1] 2
```

```
$`Other/Unspecified Ethnicity`
$`Other/Unspecified Ethnicity`$rows
[1] 228 229

$`Other/Unspecified Ethnicity`$cols
[1] 2


> plist
$rows
[1] 219 220

$cols
[1] 2

> res
  Male Female
   219    220
> plist
$rows
[1] 221 222 223

$cols
[1] 2

> res
   Male  Female Unknown
    221     222     223
> plist
$rows
[1] 224 225

$cols
[1] 2

> res
  Male Female
   224    225
> plist
$rows
[1] 226 227

$cols
[1] 2

> res
  Male Female
   226    227
> plist
$rows
[1] 228 229

$cols
[1] 2

> res
  Male Female
```

```
   228    229
> res
$`NZ Maori`
$`NZ Maori`$rows
[1] 231 232

$`NZ Maori`$cols
[1] 2


$`NZ European`
$`NZ European`$rows
[1] 233 234 235

$`NZ European`$cols
[1] 2


$`Pasifika Peoples`
$`Pasifika Peoples`$rows
[1] 236 237

$`Pasifika Peoples`$cols
[1] 2


$Asian
$Asian$rows
[1] 238 239

$Asian$cols
[1] 2


$`Other/Unspecified Ethnicity`
$`Other/Unspecified Ethnicity`$rows
[1] 240 241

$`Other/Unspecified Ethnicity`$cols
[1] 2


> plist
$rows
[1] 231 232

$cols
[1] 2

> res
  Male Female
   231    232
> plist
$rows
[1] 233 234 235

$cols
```

```
[1] 2

> res
   Male  Female Unknown
    233     234     235
> plist
$rows
[1] 236 237

$cols
[1] 2

> res
  Male Female
   236    237
> plist
$rows
[1] 238 239

$cols
[1] 2

> res
  Male Female
   238    239
> plist
$rows
[1] 240 241

$cols
[1] 2

> res
  Male Female
   240    241
> res
$`NZ Maori`
$`NZ Maori`$rows
[1] 243 244

$`NZ Maori`$cols
[1] 2


$`NZ European`
$`NZ European`$rows
[1] 245 246 247

$`NZ European`$cols
[1] 2


$`Pasifika Peoples`
$`Pasifika Peoples`$rows
[1] 248 249

$`Pasifika Peoples`$cols
```

```
[1] 2


$Asian
$Asian$rows
[1] 250 251

$Asian$cols
[1] 2


$`Other/Unspecified Ethnicity`
$`Other/Unspecified Ethnicity`$rows
[1] 252 253

$`Other/Unspecified Ethnicity`$cols
[1] 2


> plist
$rows
[1] 243 244

$cols
[1] 2

> res
  Male Female
   243    244
> plist
$rows
[1] 245 246 247

$cols
[1] 2

> res
   Male  Female Unknown
    245     246     247
> plist
$rows
[1] 248 249

$cols
[1] 2

> res
  Male Female
   248    249
> plist
$rows
[1] 250 251

$cols
[1] 2

> res
```

```
  Male Female
   250    251
> plist
$rows
[1] 252 253

$cols
[1] 2

> res
  Male Female
   252    253
> res
$`NZ Maori`
$`NZ Maori`$rows
[1] 255 256

$`NZ Maori`$cols
[1] 2


$`NZ European`
$`NZ European`$rows
[1] 257 258 259

$`NZ European`$cols
[1] 2


$`Pasifika Peoples`
$`Pasifika Peoples`$rows
[1] 260 261

$`Pasifika Peoples`$cols
[1] 2


$Asian
$Asian$rows
[1] 262 263

$Asian$cols
[1] 2


$`Other/Unspecified Ethnicity`
$`Other/Unspecified Ethnicity`$rows
[1] 264 265

$`Other/Unspecified Ethnicity`$cols
[1] 2


> plist
$rows
[1] 255 256
```

```
$cols
[1] 2

> res
  Male Female
   255    256
> plist
$rows
[1] 257 258 259

$cols
[1] 2

> res
   Male  Female Unknown
    257     258     259
> plist
$rows
[1] 260 261

$cols
[1] 2

> res
  Male Female
   260    261
> plist
$rows
[1] 262 263

$cols
[1] 2

> res
  Male Female
   262    263
> plist
$rows
[1] 264 265

$cols
[1] 2

> res
  Male Female
   264    265
> res
$`NZ Maori`
$`NZ Maori`$rows
[1] 267 268

$`NZ Maori`$cols
[1] 2


$`NZ European`
$`NZ European`$rows
```

```
[1] 269 270 271

$`NZ European`$cols
[1] 2


$`Pasifika Peoples`
$`Pasifika Peoples`$rows
[1] 272 273

$`Pasifika Peoples`$cols
[1] 2


$Asian
$Asian$rows
[1] 274 275

$Asian$cols
[1] 2


$`Other/Unspecified Ethnicity`
$`Other/Unspecified Ethnicity`$rows
[1] 276 277

$`Other/Unspecified Ethnicity`$cols
[1] 2


> plist
$rows
[1] 267 268

$cols
[1] 2

> res
  Male Female
   267    268
> plist
$rows
[1] 269 270 271

$cols
[1] 2

> res
   Male  Female Unknown
    269     270     271
> plist
$rows
[1] 272 273

$cols
[1] 2
```

```
> res
  Male Female
   272    273
> plist
$rows
[1] 274 275

$cols
[1] 2

> res
  Male Female
   274    275
> plist
$rows
[1] 276 277

$cols
[1] 2

> res
  Male Female
   276    277
> res
$`NZ Maori`
$`NZ Maori`$rows
[1] 279 280

$`NZ Maori`$cols
[1] 2


$`NZ European`
$`NZ European`$rows
[1] 281 282 283

$`NZ European`$cols
[1] 2


$`Pasifika Peoples`
$`Pasifika Peoples`$rows
[1] 284 285

$`Pasifika Peoples`$cols
[1] 2


$Asian
$Asian$rows
[1] 286 287

$Asian$cols
[1] 2


$`Other/Unspecified Ethnicity`
```

```
$`Other/Unspecified Ethnicity`$rows
[1] 288 289

$`Other/Unspecified Ethnicity`$cols
[1] 2


> plist
$rows
[1] 279 280

$cols
[1] 2

> res
  Male Female
   279    280
> plist
$rows
[1] 281 282 283

$cols
[1] 2

> res
   Male  Female Unknown
    281     282     283
> plist
$rows
[1] 284 285

$cols
[1] 2

> res
  Male Female
   284    285
> plist
$rows
[1] 286 287

$cols
[1] 2

> res
  Male Female
   286    287
> plist
$rows
[1] 288 289

$cols
[1] 2

> res
  Male Female
   288    289
```

```
> res
$`NZ Maori`
$`NZ Maori`$rows
[1] 291 292

$`NZ Maori`$cols
[1] 2


$`NZ European`
$`NZ European`$rows
[1] 293 294 295

$`NZ European`$cols
[1] 2


$`Pasifika Peoples`
$`Pasifika Peoples`$rows
[1] 296 297

$`Pasifika Peoples`$cols
[1] 2


$Asian
$Asian$rows
[1] 298 299

$Asian$cols
[1] 2


$`Other/Unspecified Ethnicity`
$`Other/Unspecified Ethnicity`$rows
[1] 300 301

$`Other/Unspecified Ethnicity`$cols
[1] 2


> plist
$rows
[1] 291 292

$cols
[1] 2

> res
  Male Female
   291    292
> plist
$rows
[1] 293 294 295

$cols
[1] 2
```

```
> res
   Male  Female Unknown
    293     294     295
> plist
$rows
[1] 296 297

$cols
[1] 2

> res
  Male Female
   296    297
> plist
$rows
[1] 298 299

$cols
[1] 2

> res
  Male Female
   298    299
> plist
$rows
[1] 300 301

$cols
[1] 2

> res
  Male Female
   300    301
> res
$`NZ Maori`
$`NZ Maori`$rows
[1] 303 304

$`NZ Maori`$cols
[1] 2


$`NZ European`
$`NZ European`$rows
[1] 305 306 307

$`NZ European`$cols
[1] 2


$`Pasifika Peoples`
$`Pasifika Peoples`$rows
[1] 308 309

$`Pasifika Peoples`$cols
[1] 2
```

```
$Asian
$Asian$rows
[1] 310 311

$Asian$cols
[1] 2


$`Other/Unspecified Ethnicity`
$`Other/Unspecified Ethnicity`$rows
[1] 312 313

$`Other/Unspecified Ethnicity`$cols
[1] 2


> plist
$rows
[1] 303 304

$cols
[1] 2

> res
  Male Female
   303    304
> plist
$rows
[1] 305 306 307

$cols
[1] 2

> res
   Male  Female Unknown
    305     306     307
> plist
$rows
[1] 308 309

$cols
[1] 2

> res
  Male Female
   308    309
> plist
$rows
[1] 310 311

$cols
[1] 2

> res
  Male Female
```

```
   310    311
> plist
$rows
[1] 312 313

$cols
[1] 2

> res
  Male Female
   312    313
> res
$`NZ Maori`
$`NZ Maori`$rows
[1] 315 316

$`NZ Maori`$cols
[1] 2


$`NZ European`
$`NZ European`$rows
[1] 317 318 319

$`NZ European`$cols
[1] 2


$`Pasifika Peoples`
$`Pasifika Peoples`$rows
[1] 320 321

$`Pasifika Peoples`$cols
[1] 2


$Asian
$Asian$rows
[1] 322 323

$Asian$cols
[1] 2


$`Other/Unspecified Ethnicity`
$`Other/Unspecified Ethnicity`$rows
[1] 324 325

$`Other/Unspecified Ethnicity`$cols
[1] 2


> plist
$rows
[1] 315 316

$cols
```

```
[1] 2

> res
  Male Female
   315    316
> plist
$rows
[1] 317 318 319

$cols
[1] 2

> res
   Male  Female Unknown
    317     318     319
> plist
$rows
[1] 320 321

$cols
[1] 2

> res
  Male Female
   320    321
> plist
$rows
[1] 322 323

$cols
[1] 2

> res
  Male Female
   322    323
> plist
$rows
[1] 324 325

$cols
[1] 2

> res
  Male Female
   324    325
> res
$`NZ Maori`
$`NZ Maori`$rows
[1] 327 328

$`NZ Maori`$cols
[1] 2


$`NZ European`
$`NZ European`$rows
[1] 329 330 331
```

```
$‘NZ European‘$cols
[1] 2


$‘Pasifika Peoples‘
$‘Pasifika Peoples‘$rows
[1] 332 333

$‘Pasifika Peoples‘$cols
[1] 2


$Asian
$Asian$rows
[1] 334 335

$Asian$cols
[1] 2


$‘Other/Unspecified Ethnicity‘
$‘Other/Unspecified Ethnicity‘$rows
[1] 336 337

$‘Other/Unspecified Ethnicity‘$cols
[1] 2


> plist
$rows
[1] 327 328

$cols
[1] 2

> res
  Male Female
   327    328
> plist
$rows
[1] 329 330 331

$cols
[1] 2

> res
   Male  Female Unknown
    329     330     331
> plist
$rows
[1] 332 333

$cols
[1] 2

> res
```

```
  Male Female
   332    333
> plist
$rows
[1] 334 335

$cols
[1] 2

> res
  Male Female
   334    335
> plist
$rows
[1] 336 337

$cols
[1] 2

> res
  Male Female
   336    337
> res
$`NZ Maori`
$`NZ Maori`$rows
[1] 339 340

$`NZ Maori`$cols
[1] 2


$`NZ European`
$`NZ European`$rows
[1] 341 342 343

$`NZ European`$cols
[1] 2


$`Pasifika Peoples`
$`Pasifika Peoples`$rows
[1] 344 345

$`Pasifika Peoples`$cols
[1] 2


$Asian
$Asian$rows
[1] 346 347

$Asian$cols
[1] 2


$`Other/Unspecified Ethnicity`
$`Other/Unspecified Ethnicity`$rows
```

```
[1] 348 349

$`Other/Unspecified Ethnicity`$cols
[1] 2


> plist
$rows
[1] 339 340

$cols
[1] 2

> res
  Male Female
   339    340
> plist
$rows
[1] 341 342 343

$cols
[1] 2

> res
   Male  Female Unknown
    341     342     343
> plist
$rows
[1] 344 345

$cols
[1] 2

> res
  Male Female
   344    345
> plist
$rows
[1] 346 347

$cols
[1] 2

> res
  Male Female
   346    347
> plist
$rows
[1] 348 349

$cols
[1] 2

> res
  Male Female
   348    349
> res
```

```
$`NZ Maori`
$`NZ Maori`$rows
[1] 351 352

$`NZ Maori`$cols
[1] 2


$`NZ European`
$`NZ European`$rows
[1] 353 354 355

$`NZ European`$cols
[1] 2


$`Pasifika Peoples`
$`Pasifika Peoples`$rows
[1] 356 357

$`Pasifika Peoples`$cols
[1] 2


$Asian
$Asian$rows
[1] 358 359

$Asian$cols
[1] 2


$`Other/Unspecified Ethnicity`
$`Other/Unspecified Ethnicity`$rows
[1] 360 361

$`Other/Unspecified Ethnicity`$cols
[1] 2


> plist
$rows
[1] 351 352

$cols
[1] 2

> res
  Male Female
   351    352
> plist
$rows
[1] 353 354 355

$cols
[1] 2
```

```
> res
   Male  Female Unknown
    353     354     355
> plist
$rows
[1] 356 357

$cols
[1] 2

> res
  Male Female
   356    357
> plist
$rows
[1] 358 359

$cols
[1] 2

> res
  Male Female
   358    359
> plist
$rows
[1] 360 361

$cols
[1] 2

> res
  Male Female
   360    361
> res
$`NZ Maori`
$`NZ Maori`$rows
[1] 363 364

$`NZ Maori`$cols
[1] 2


$`NZ European`
$`NZ European`$rows
[1] 365 366 367

$`NZ European`$cols
[1] 2


$`Pasifika Peoples`
$`Pasifika Peoples`$rows
[1] 368 369

$`Pasifika Peoples`$cols
[1] 2
```

```
$Asian
$Asian$rows
[1] 370 371

$Asian$cols
[1] 2


$`Other/Unspecified Ethnicity`
$`Other/Unspecified Ethnicity`$rows
[1] 372 373

$`Other/Unspecified Ethnicity`$cols
[1] 2


> plist
$rows
[1] 363 364

$cols
[1] 2

> res
  Male Female
   363    364
> plist
$rows
[1] 365 366 367

$cols
[1] 2

> res
   Male  Female Unknown
    365     366     367
> plist
$rows
[1] 368 369

$cols
[1] 2

> res
  Male Female
   368    369
> plist
$rows
[1] 370 371

$cols
[1] 2

> res
  Male Female
   370    371
```

```
> plist
$rows
[1] 372 373

$cols
[1] 2

> res
  Male Female
   372    373
> res
$`NZ Maori`
$`NZ Maori`$rows
[1] 375 376

$`NZ Maori`$cols
[1] 2


$`NZ European`
$`NZ European`$rows
[1] 377 378 379

$`NZ European`$cols
[1] 2


$`Pasifika Peoples`
$`Pasifika Peoples`$rows
[1] 380 381

$`Pasifika Peoples`$cols
[1] 2


$Asian
$Asian$rows
[1] 382 383

$Asian$cols
[1] 2


$`Other/Unspecified Ethnicity`
$`Other/Unspecified Ethnicity`$rows
[1] 384 385

$`Other/Unspecified Ethnicity`$cols
[1] 2


> plist
$rows
[1] 375 376

$cols
[1] 2
```

```
> res
  Male Female
   375    376
> plist
$rows
[1] 377 378 379

$cols
[1] 2

> res
   Male  Female Unknown
    377     378     379
> plist
$rows
[1] 380 381

$cols
[1] 2

> res
  Male Female
   380    381
> plist
$rows
[1] 382 383

$cols
[1] 2

> res
  Male Female
   382    383
> plist
$rows
[1] 384 385

$cols
[1] 2

> res
  Male Female
   384    385
> res
$`NZ Maori`
$`NZ Maori`$rows
[1] 387 388

$`NZ Maori`$cols
[1] 2


$`NZ European`
$`NZ European`$rows
[1] 389 390 391
```

```
$‘NZ European‘$cols
[1] 2


$‘Pasifika Peoples‘
$‘Pasifika Peoples‘$rows
[1] 392 393

$‘Pasifika Peoples‘$cols
[1] 2


$Asian
$Asian$rows
[1] 394 395

$Asian$cols
[1] 2


$‘Other/Unspecified Ethnicity‘
$‘Other/Unspecified Ethnicity‘$rows
[1] 396 397

$‘Other/Unspecified Ethnicity‘$cols
[1] 2


> plist
$rows
[1] 387 388

$cols
[1] 2

> res
  Male Female
   387    388
> plist
$rows
[1] 389 390 391

$cols
[1] 2

> res
   Male  Female Unknown
    389     390     391
> plist
$rows
[1] 392 393

$cols
[1] 2

> res
  Male Female
```

```
   392    393
> plist
$rows
[1] 394 395

$cols
[1] 2

> res
  Male Female
   394    395
> plist
$rows
[1] 396 397

$cols
[1] 2

> res
  Male Female
   396    397
> res
$`NZ Maori`
$`NZ Maori`$rows
[1] 399 400

$`NZ Maori`$cols
[1] 2


$`NZ European`
$`NZ European`$rows
[1] 401 402 403

$`NZ European`$cols
[1] 2


$`Pasifika Peoples`
$`Pasifika Peoples`$rows
[1] 404 405

$`Pasifika Peoples`$cols
[1] 2


$Asian
$Asian$rows
[1] 406 407

$Asian$cols
[1] 2


$`Other/Unspecified Ethnicity`
$`Other/Unspecified Ethnicity`$rows
[1] 408 409
```

```
$`Other/Unspecified Ethnicity`$cols
[1] 2


> plist
$rows
[1] 399 400

$cols
[1] 2

> res
  Male Female
   399    400
> plist
$rows
[1] 401 402 403

$cols
[1] 2

> res
   Male  Female Unknown
    401     402     403
> plist
$rows
[1] 404 405

$cols
[1] 2

> res
  Male Female
   404    405
> plist
$rows
[1] 406 407

$cols
[1] 2

> res
  Male Female
   406    407
> plist
$rows
[1] 408 409

$cols
[1] 2

> res
  Male Female
   408    409
> res
$`NZ Maori`
```

```
$‘NZ Maori‘$rows
[1] 411 412

$‘NZ Maori‘$cols
[1] 2


$‘NZ European‘
$‘NZ European‘$rows
[1] 413 414 415

$‘NZ European‘$cols
[1] 2


$‘Pasifika Peoples‘
$‘Pasifika Peoples‘$rows
[1] 416 417

$‘Pasifika Peoples‘$cols
[1] 2


$Asian
$Asian$rows
[1] 418 419

$Asian$cols
[1] 2


$‘Other/Unspecified Ethnicity‘
$‘Other/Unspecified Ethnicity‘$rows
[1] 420 421

$‘Other/Unspecified Ethnicity‘$cols
[1] 2


> plist
$rows
[1] 411 412

$cols
[1] 2

> res
  Male Female
   411    412
> plist
$rows
[1] 413 414 415

$cols
[1] 2

> res
```

```
   Male  Female Unknown
    413     414     415
> plist
$rows
[1] 416 417

$cols
[1] 2

> res
  Male Female
   416    417
> plist
$rows
[1] 418 419

$cols
[1] 2

> res
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"Decile 8-10"            NA            NA            NA            NA
          V27
           NA
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"Scholarship"
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          V18
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"Scholarship"
> currow[curcols]
          V21          V22          V23          V25          V26
    "Entries"     "Absent"        "SNA"   "Assessed"   "Achieved"
          V27
"Scholarship"
> matColLabel
     V3           V4       V5    V7         V8         V9
[1,] NA           NA       NA    NA         NA         NA
[2,] "Decile 1-3" NA       NA    NA         NA         NA
[3,] "# of "      "# "     "# "  "# "       "# Not "   "# "
[4,] "Entries"    "Absent" "SNA" "Assessed" "Achieved" "Scholarship"
> matColLabel
     V3           V4       V5    V7         V8         V9
[1,] NA           NA       NA    NA         NA         NA
[2,] "Decile 1-3" NA       NA    NA         NA         NA
[3,] "# of "      "# "     "# "  "# "       "# Not "   "# "
[4,] "Entries"    "Absent" "SNA" "Assessed" "Achieved" "Scholarship"
> matColLabel
     V3              V4          V5       V7             V8
[1,] NA              NA          NA       NA             NA
[2,] "Decile 1-3"    NA          NA       NA             NA
[3,] "# of  Entries" "#  Absent" "#  SNA" "#  Assessed" "# Not  Achieved"
     V9
[1,] NA
[2,] NA
[3,] "#  Scholarship"
> res
$`Decile 1-3`
$`Decile 1-3`$rows
[1] 1 2 3 4 5 6 7

$`Decile 1-3`$cols
```

```
[1] 3


$`Decile 4-7`
$`Decile 4-7`$rows
[1]  8  9 10 11 12 13 14

$`Decile 4-7`$cols
[1] 3


$`Decile 8-10`
$`Decile 8-10`$rows
[1] 15 16 17 18 19 20 21

$`Decile 8-10`$cols
[1] 3


> plist
$rows
[1] 1 2 3 4 5 6 7

$cols
[1] 3

> res
  # of  Entries       #  Absent          #  SNA     #  Assessed # Not  Achieved
              1               2               3               4               5
 #  Scholarship
              6
> plist
$rows
[1]  8  9 10 11 12 13 14

$cols
[1] 3

> res
  # of  Entries       #  Absent          #  SNA     #  Assessed # Not  Achieved
              8               9              10              11              12
 #  Scholarship
             13
> plist
$rows
[1] 15 16 17 18 19 20 21

$cols
[1] 3

> res
  # of  Entries       #  Absent          #  SNA     #  Assessed # Not  Achieved
             15              16              17              18              19
 #  Scholarship
             20
> plist
  # of  Entries       #  Absent          #  SNA     #  Assessed # Not  Achieved
```

```
             1              2              3              4              5
 #  Scholarship
             6
> matData
     V3    V4    V5    V7    V8    V9
[1,] "2.0" "1.0" "0.0" "1.0" "1.0" "0.0"
[2,] "0.0" "0.0" "0.0" "0.0" "0.0" "0.0"
[3,] "2.0" "0.0" "0.0" "2.0" "1.0" "1.0"
[4,] "3.0" "0.0" "0.0" "3.0" "2.0" "1.0"
[5,] "0.0" "0.0" "0.0" "0.0" "0.0" "0.0"
[6,] "2.0" "0.0" "0.0" "2.0" "2.0" "0.0"
> datbit
     V3    V4    V5    V7    V8    V9
[1,] "2.0" "1.0" "0.0" "1.0" "1.0" "0.0"
[2,] "0.0" "0.0" "0.0" "0.0" "0.0" "0.0"
[3,] "2.0" "0.0" "0.0" "2.0" "1.0" "1.0"
[4,] "3.0" "0.0" "0.0" "3.0" "2.0" "1.0"
[5,] "0.0" "0.0" "0.0" "0.0" "0.0" "0.0"
[6,] "2.0" "0.0" "0.0" "2.0" "2.0" "0.0"
> plist
  # of  Entries       #  Absent          #  SNA     #  Assessed # Not  Achieved
             8              9             10             11             12
 #  Scholarship
            13
> matData
     V3    V4    V5    V7    V8    V9
[1,] "2.0" "1.0" "0.0" "1.0" "1.0" "0.0"
[2,] "0.0" "0.0" "0.0" "0.0" "0.0" "0.0"
[3,] "2.0" "0.0" "0.0" "2.0" "1.0" "1.0"
[4,] "3.0" "0.0" "0.0" "3.0" "2.0" "1.0"
[5,] "0.0" "0.0" "0.0" "0.0" "0.0" "0.0"
[6,] "2.0" "0.0" "0.0" "2.0" "2.0" "0.0"
> datbit
     V12    V13    V14   V16    V17    V18
[1,] "2.0"  "1.0"  "0.0" "1.0"  "1.0"  "0.0"
[2,] "7.0"  "2.0"  "0.0" "5.0"  "4.0"  "1.0"
[3,] "51.0" "13.0" "0.0" "38.0" "30.0" "8.0"
[4,] "44.0" "12.0" "0.0" "32.0" "27.0" "3.0"
[5,] "0.0"  "0.0"  "0.0" "0.0"  "0.0"  "0.0"
[6,] "3.0"  "0.0"  "0.0" "3.0"  "3.0"  "0.0"
> plist
  # of  Entries       #  Absent          #  SNA     #  Assessed # Not  Achieved
            15             16             17             18             19
 #  Scholarship
            20
> matData
     V3    V4    V5    V7    V8    V9
[1,] "2.0" "1.0" "0.0" "1.0" "1.0" "0.0"
[2,] "0.0" "0.0" "0.0" "0.0" "0.0" "0.0"
[3,] "2.0" "0.0" "0.0" "2.0" "1.0" "1.0"
[4,] "3.0" "0.0" "0.0" "3.0" "2.0" "1.0"
[5,] "0.0" "0.0" "0.0" "0.0" "0.0" "0.0"
[6,] "2.0" "0.0" "0.0" "2.0" "2.0" "0.0"
> datbit
     V21     V22    V23   V25    V26    V27
[1,] "2.0"   "2.0"  "0.0" "0.0"  "0.0"  "0.0"
[2,] "3.0"   "2.0"  "0.0" "1.0"  "1.0"  "0.0"
```

```
[3,] "132.0" "47.0" "0.0" "85.0" "67.0" "18.0"
[4,] "71.0"  "22.0" "0.0" "49.0" "35.0" "10.0"
[5,] "0.0"   "0.0"  "0.0" "0.0"  "0.0"  "0.0"
[6,] "3.0"   "1.0"  "0.0" "2.0"  "2.0"  "0.0"
> colplist
$`Decile 1-3`
+ # of  Entries (1, 3)
+ #  Absent (2, 3)
+ #  SNA (3, 3)
+ #  Assessed (4, 3)
+ # Not  Achieved (5, 3)
+ #  Scholarship (6, 3)
+ #  Outstanding (7, 3)

$`Decile 4-7`
+ # of  Entries (8, 3)
+ #  Absent (9, 3)
+ #  SNA (10, 3)
+ #  Assessed (11, 3)
+ # Not  Achieved (12, 3)
+ #  Scholarship (13, 3)
+ #  Outstanding (14, 3)

$`Decile 8-10`
+ # of  Entries (15, 3)
+ #  Absent (16, 3)
+ #  SNA (17, 3)
+ #  Assessed (18, 3)
+ # Not  Achieved (19, 3)
+ #  Scholarship (20, 3)
+ #  Outstanding (21, 3)

> res
     UNKNOWN      UNKNOWN    UNKNOWN          UNKNOWN UNKNOWN # of  Entries
1 Decile 1-3 All Subjects Accounting         NZ Maori    Male             2
2 Decile 1-3 All Subjects Accounting         NZ Maori  Female             0
3 Decile 1-3 All Subjects Accounting      NZ European    Male             2
4 Decile 1-3 All Subjects Accounting      NZ European  Female             3
5 Decile 1-3 All Subjects Accounting      NZ European Unknown             0
6 Decile 1-3 All Subjects Accounting Pasifika Peoples    Male             2
  #  Absent #  SNA #  Assessed # Not  Achieved #  Scholarship #  Outstanding
1         1      0           1               1              0              0
2         0      0           0               0              0              0
3         0      0           2               1              1              0
4         0      0           3               2              1              0
5         0      0           0               0              0              0
6         0      0           2               2              0              0
```

8.4 NZQASubjects.xls

	1	2	3	4	5	6	7	8	9	10	11	12	13
1	Standard(s) and Subject(s) (broken down by Ethnicity and Gender)												
2													
3	Accounting Externally Assessed Achievement S				National								
4	Standard Le	Ethnicity	Gender		# of Results		# Not Achieved		# Achieved		# Merit		# Excellenc
5													
6	Level 1				17,692		3,859		5,683		4,978		3,172
7		NZ Maori			1,633		545		609		350		129
8			Male		847		260		327		193		67
9			Female		786		285		282		157		62
10		NZ European			9,404		1,610		3,081		2,873		1,840
11			Male		5,508		976		1,935		1,673		924
12			Female		3,896		634		1,146		1,200		916
13		Pasifika Peoples			1,490		694		494		227		75
14			Male		538		244		168		96		30
15			Female		952		450		326		131		45
16		Asian			4,749		893		1,359		1,425		1,072
17			Male		2,265		471		685		667		442
18			Female		2,484		422		674		758		630
19		Other/Unspecified Ethnicity			416		117		140		103		56
20			Male		206		53		80		50		23
21			Female		210		64		60		53		33
22													
23	Level 2				13,540		3,617		4,762		3,355		1,806
24		NZ Maori			901		390		323		138		50
25			Male		454		181		177		72		24
26			Female		447		209		146		66		26
27		NZ European			7,642		1,719		2,760		2,023		1,140
28			Male		4,247		991		1,532		1,101		623
29			Female		3,395		728		1,228		922		517
30		Pasifika Peoples			911		455		326		112		18
31			Male		328		157		126		41		4
32			Female		583		298		200		71		14
33		Asian			3,796		973		1,253		999		571
34			Male		1,834		484		633		460		257
35			Female		1,962		489		620		539		314
36		Other/Unspecified Ethnicity			290		80		100		83		27
37			Male		137		38		44		40		15
38			Female		153		42		56		43		12
39													
40	Level 3				9,373		2,802		3,183		2,277		1,111
41		NZ Maori			504		240		162		73		29
42			Male		265		117		92		36		20
43			Female		239		123		70		37		9

```
> rowData
[1]  6 55
> colData
[1]  5 13
> rowslist
$label
[1] 1 3 4

$data
 [1]  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 23 24 25 26 27 28 29 30 31
[26] 32 33 34 35 36 37 38 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55

> colslist
$label
[1] 1 2 3

$data
[1]  5  7  9 11 13

> res
$`Level 1`
$`Level 1`$rows
 [1]  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16

$`Level 1`$cols
[1] 1 2 3
```

```
$`Level 2`
$`Level 2`$rows
 [1] 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32

$`Level 2`$cols
[1] 1 2 3


$`Level 3`
$`Level 3`$rows
 [1] 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48

$`Level 3`$cols
[1] 1 2 3


> res
$`NZ Maori`
$`NZ Maori`$rows
[1] 3 4

$`NZ Maori`$cols
[1] 2 3


$`NZ European`
$`NZ European`$rows
[1] 6 7

$`NZ European`$cols
[1] 2 3


$`Pasifika Peoples`
$`Pasifika Peoples`$rows
[1]  9 10

$`Pasifika Peoples`$cols
[1] 2 3


$Asian
$Asian$rows
[1] 12 13

$Asian$cols
[1] 2 3


$`Other/Unspecified Ethnicity`
$`Other/Unspecified Ethnicity`$rows
[1] 15 16

$`Other/Unspecified Ethnicity`$cols
[1] 2 3
```

```
> plist
$rows
[1] 3 4

$cols
[1] 3

> res
  Male Female
     3      4
> plist
$rows
[1] 6 7

$cols
[1] 3

> res
  Male Female
     6      7
> plist
$rows
[1]  9 10

$cols
[1] 3

> res
  Male Female
     9     10
> plist
$rows
[1] 12 13

$cols
[1] 3

> res
  Male Female
    12     13
> plist
$rows
[1] 15 16

$cols
[1] 3

> res
  Male Female
    15     16
> res
$`NZ Maori`
$`NZ Maori`$rows
[1] 19 20
```

```
$`NZ Maori`$cols
[1] 2 3


$`NZ European`
$`NZ European`$rows
[1] 22 23

$`NZ European`$cols
[1] 2 3


$`Pasifika Peoples`
$`Pasifika Peoples`$rows
[1] 25 26

$`Pasifika Peoples`$cols
[1] 2 3


$Asian
$Asian$rows
[1] 28 29

$Asian$cols
[1] 2 3


$`Other/Unspecified Ethnicity`
$`Other/Unspecified Ethnicity`$rows
[1] 31 32

$`Other/Unspecified Ethnicity`$cols
[1] 2 3


> plist
$rows
[1] 19 20

$cols
[1] 3

> res
  Male Female
    19     20
> plist
$rows
[1] 22 23

$cols
[1] 3

> res
  Male Female
    22     23
> plist
```

```
$rows
[1] 25 26

$cols
[1] 3

> res
  Male Female
    25     26
> plist
$rows
[1] 28 29

$cols
[1] 3

> res
  Male Female
    28     29
> plist
$rows
[1] 31 32

$cols
[1] 3

> res
  Male Female
    31     32
> res
$`NZ Maori`
$`NZ Maori`$rows
[1] 35 36

$`NZ Maori`$cols
[1] 2 3


$`NZ European`
$`NZ European`$rows
[1] 38 39

$`NZ European`$cols
[1] 2 3


$`Pasifika Peoples`
$`Pasifika Peoples`$rows
[1] 41 42

$`Pasifika Peoples`$cols
[1] 2 3


$Asian
$Asian$rows
[1] 44 45
```

```
$Asian$cols
[1] 2 3


$`Other/Unspecified Ethnicity`
$`Other/Unspecified Ethnicity`$rows
[1] 47 48

$`Other/Unspecified Ethnicity`$cols
[1] 2 3


> plist
$rows
[1] 35 36

$cols
[1] 3

> res
  Male Female
    35     36
> plist
$rows
[1] 38 39

$cols
[1] 3

> res
  Male Female
    38     39
> plist
$rows
[1] 41 42

$cols
[1] 3

> res
  Male Female
    41     42
> plist
$rows
[1] 44 45

$cols
[1] 3

> res
  Male Female
    44     45
> plist
$rows
[1] 47 48
```

```
$cols
[1] 3

> res
  Male Female
    47     48
> rowplist
$`Level 1`
+ NZ Maori (2, 2)
- + Male (3, 3)
- + Female (4, 3)
+ NZ European (5, 2)
- + Male (6, 3)
- + Female (7, 3)
+ Pasifika Peoples (8, 2)
- + Male (9, 3)
- + Female (10, 3)
+ Asian (11, 2)
- + Male (12, 3)
- + Female (13, 3)
+ Other/Unspecified Ethnicity (14, 2)
- + Male (15, 3)
- + Female (16, 3)

$`Level 2`
+ NZ Maori (18, 2)
- + Male (19, 3)
- + Female (20, 3)
+ NZ European (21, 2)
- + Male (22, 3)
- + Female (23, 3)
+ Pasifika Peoples (24, 2)
- + Male (25, 3)
- + Female (26, 3)
+ Asian (27, 2)
- + Male (28, 3)
- + Female (29, 3)
+ Other/Unspecified Ethnicity (30, 2)
- + Male (31, 3)
- + Female (32, 3)

$`Level 3`
+ NZ Maori (34, 2)
- + Male (35, 3)
- + Female (36, 3)
+ NZ European (37, 2)
- + Male (38, 3)
- + Female (39, 3)
+ Pasifika Peoples (40, 2)
- + Male (41, 3)
- + Female (42, 3)
+ Asian (43, 2)
- + Male (44, 3)
- + Female (45, 3)
+ Other/Unspecified Ethnicity (46, 2)
- + Male (47, 3)
- + Female (48, 3)
```

```
> rowvecs
     [,1]      [,2]              [,3]
[1,] "Level 1" "NZ Maori"        "Male"
[2,] "Level 1" "NZ Maori"        "Female"
[3,] "Level 1" "NZ European"     "Male"
[4,] "Level 1" "NZ European"     "Female"
[5,] "Level 1" "Pasifika Peoples" "Male"
[6,] "Level 1" "Pasifika Peoples" "Female"
> matColLabel
     V5             V7               V9           V11        V13
[1,] NA             NA               NA           NA         NA
[2,] "National"     NA               NA           NA         NA
[3,] "# of Results" "# Not Achieved" "# Achieved" "# Merit" "# Excellence"
> cursub
        V5          V7          V9         V11        V13
"National"          NA          NA          NA         NA
> currow[curcols]
        V5          V7          V9         V11        V13
"National"          NA          NA          NA         NA
> cursub
              V5                V7                V9              V11
  "# of Results" "# Not Achieved"     "# Achieved"        "# Merit"
             V13
  "# Excellence"
> currow[curcols]
              V5                V7                V9              V11
  "# of Results" "# Not Achieved"     "# Achieved"        "# Merit"
             V13
  "# Excellence"
> matColLabel
     V5             V7               V9           V11        V13
[1,] NA             NA               NA           NA         NA
[2,] "National"     NA               NA           NA         NA
[3,] "# of Results" "# Not Achieved" "# Achieved" "# Merit" "# Excellence"
> matColLabel
     V5             V7               V9           V11        V13
[1,] NA             NA               NA           NA         NA
[2,] "National"     NA               NA           NA         NA
[3,] "# of Results" "# Not Achieved" "# Achieved" "# Merit" "# Excellence"
> matColLabel
     V5             V7               V9           V11        V13
[1,] NA             NA               NA           NA         NA
[2,] "National"     NA               NA           NA         NA
[3,] "# of Results" "# Not Achieved" "# Achieved" "# Merit" "# Excellence"
> res
$National
$National$rows
[1] 1 2 3 4 5

$National$cols
[1] 3


> plist
$rows
[1] 1 2 3 4 5
```

```
$cols
[1] 3

> res
  # of Results # Not Achieved     # Achieved        # Merit   # Excellence
            1              2              3              4              5
> plist
  # of Results # Not Achieved     # Achieved        # Merit   # Excellence
            1              2              3              4              5
> matData
     V5       V7       V9       V11      V13
[1,] "847.0"  "260.0" "327.0"  "193.0"  "67.0"
[2,] "786.0"  "285.0" "282.0"  "157.0"  "62.0"
[3,] "5508.0" "976.0" "1935.0" "1673.0" "924.0"
[4,] "3896.0" "634.0" "1146.0" "1200.0" "916.0"
[5,] "538.0"  "244.0" "168.0"  "96.0"   "30.0"
[6,] "952.0"  "450.0" "326.0"  "131.0"  "45.0"
> datbit
     V5       V7       V9       V11      V13
[1,] "847.0"  "260.0" "327.0"  "193.0"  "67.0"
[2,] "786.0"  "285.0" "282.0"  "157.0"  "62.0"
[3,] "5508.0" "976.0" "1935.0" "1673.0" "924.0"
[4,] "3896.0" "634.0" "1146.0" "1200.0" "916.0"
[5,] "538.0"  "244.0" "168.0"  "96.0"   "30.0"
[6,] "952.0"  "450.0" "326.0"  "131.0"  "45.0"
> colplist
$National
+ # of Results (1, 3)
+ # Not Achieved (2, 3)
+ # Achieved (3, 3)
+ # Merit (4, 3)
+ # Excellence (5, 3)

> res
   UNKNOWN UNKNOWN           UNKNOWN UNKNOWN # of Results # Not Achieved
1 National Level 1         NZ Maori    Male          847            260
2 National Level 1         NZ Maori  Female          786            285
3 National Level 1      NZ European    Male         5508            976
4 National Level 1      NZ European  Female         3896            634
5 National Level 1 Pasifika Peoples    Male          538            244
6 National Level 1 Pasifika Peoples  Female          952            450
  # Achieved # Merit # Excellence
1        327     193           67
2        282     157           62
3       1935    1673          924
4       1146    1200          916
5        168      96           30
6        326     131           45
```

8.5 StatsNZGDP.csv

	1	2	3	4	5	6	7	8	9	10	11	12	13
1	Series, GDP(P), Nominal, Actual, Sector of ownership (Annual−Mar)												
2		Gross Domestic Product − product measure											
3		Market				Non−Market				Total Market and Non−Market			
4		Private	Central Gov	Local Gove	All Sectors	Private	Central Gov	Local Gove	All Sectors	Private	Central Gov	Local Gove	All Sectors
5	1,972	5,200	568	155	5,923	58	660	100	818	5,258	1,227	255	6,740
6	1,973	5,993	649	169	6,811	68	738	118	924	6,062	1,387	287	7,735
7	1,974	7,013	723	183	7,919	78	880	136	1,093	7,091	1,604	318	9,013
8	1,975	7,636	750	202	8,588	90	1,049	164	1,303	7,727	1,798	366	9,891
9	1,976	8,526	840	231	9,597	108	1,264	202	1,574	8,634	2,104	433	11,171
10	1,977	10,450	1,179	295	11,924	130	1,431	213	1,774	10,580	2,611	508	13,698
11	1,978	11,469	1,398	362	13,230	150	1,713	247	2,111	11,620	3,111	610	15,341
12	1,979	12,729	1,685	394	14,808	180	2,105	306	2,591	12,909	3,789	700	17,398
13	1,980	14,707	2,050	501	17,258	216	2,434	368	3,018	14,923	4,484	869	20,275
14	1,981	16,947	2,358	559	19,864	261	3,042	439	3,742	17,207	5,401	998	23,606
15	1,982	20,751	2,770	655	24,175	316	3,619	542	4,477	21,067	6,388	1,197	28,652
16	1,983	23,525	3,184	759	27,468	332	3,975	606	4,913	23,858	7,158	1,365	32,381
17	1,984	26,577	3,644	800	31,021	327	4,081	653	5,061	26,903	7,725	1,453	36,081
18	1,985	30,530	3,924	850	35,304	361	4,270	720	5,351	30,891	8,194	1,570	40,655
19	1,986	35,104	4,741	1,008	40,853	418	5,012	815	6,245	35,522	9,752	1,823	47,098
20	1,987	40,167	6,189	1,160	47,515	501	6,235	896	7,631	40,667	12,423	2,055	55,146
21	1,988	43,613	6,957	1,192	51,762	582	6,885	961	8,427	44,195	13,842	2,153	60,190
22	1,989	47,816	7,052	1,364	56,231	663	7,410	1,076	9,149	48,479	14,461	2,440	65,380
23	1,990	51,170	6,267	1,364	58,800	722	7,710	1,153	9,585	51,892	13,977	2,517	68,385
24	1,991	53,613	4,970	1,412	59,995	801	7,912	1,228	9,941	54,415	12,882	2,640	69,936
25	1,992	54,492	3,917	1,366	59,775	895	7,960	1,189	10,045	55,387	11,877	2,556	69,819
26	1,993	56,696	3,626	1,431	61,754	961	8,115	1,138	10,214	57,657	11,741	2,570	71,968
27	1,994	62,428	3,360	1,452	67,240	1,024	8,277	1,176	10,477	63,452	11,637	2,628	77,717
28	1,995	67,495	3,210	1,617	72,322	1,117	8,366	1,204	10,687	68,612	11,576	2,822	83,009
29	1,996	72,237	3,090	1,745	77,072	1,221	8,710	1,249	11,180	73,458	11,800	2,994	88,252
30	1,997	75,844	3,058	1,849	80,750	1,419	9,138	1,249	11,806	77,262	12,196	3,098	92,557
31	1,998	78,712	3,129	1,890	83,732	1,633	9,489	1,277	12,399	80,345	12,618	3,167	96,130
32	1,999	80,382	2,803	1,809	84,994	1,958	9,945	1,298	13,201	82,340	12,748	3,107	98,195
33	2,000	86,163	2,568	1,716	90,447	2,076	10,303	1,322	13,701	88,239	12,872	3,037	104,148
34	2,001	91,811	2,396	1,692	95,898	2,206	10,705	1,364	14,275	94,016	13,101	3,056	110,173
35	2,002	98,851	2,870	1,837	103,558	2,312	11,230	1,441	14,984	101,163	14,101	3,278	118,542
36	2,003	102,691	3,691	2,016	108,398	2,455	11,929	1,532	15,916	105,146	15,619	3,548	124,314
37	2,004	109,298	4,138	2,331	115,767	2,683	12,753	1,645	17,081	111,981	16,891	3,976	132,848
38	2,005	116,966	4,295	2,268	123,528	2,937	13,812	1,769	18,518	119,902	18,107	4,037	142,046
39	2,006	122,292	4,859	2,685	129,835	3,013	15,058	1,899	19,971	125,305	19,917	4,584	149,806
40	2,007	127,531	4,857	2,735	135,123	3,131	16,257	2,105	21,493	130,662	21,114	4,840	156,616
41	2,008	138,127	5,554	2,962	146,644	3,317	17,569	2,298	23,184	141,444	23,124	5,260	169,828
42	2,009	137,240	5,783	3,195	146,219	3,742	19,067	2,470	25,279	140,982	24,850	5,666	171,498
43	2,010	139,525	6,090	3,252	148,866	3,942	20,007	2,605	26,553	143,466	26,097	5,856	175,419

```
> rowData
[1]  5 43
> colData
[1]  1 37
> rowslist
$label
[1] 1 2 3 4

$data
 [1]  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29
[26] 30 31 32 33 34 35 36 37 38 39 40 41 42 43

> colslist
$label
integer(0)

$data
 [1]  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
[26] 26 27 28 29 30 31 32 33 34 35 36 37

> plist
$rows
 [1]  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
[26] 26 27 28 29 30 31 32 33 34 35 36 37 38 39

$cols
```

```
[1] 1

> res
1972 1973 1974 1975 1976 1977
   1    2    3    4    5    6
> rowplist
1972 1973 1974 1975 1976 1977
   1    2    3    4    5    6
> rowvecs
     [,1]
[1,] "1972"
[2,] "1973"
[3,] "1974"
[4,] "1975"
[5,] "1976"
[6,] "1977"
> matColLabel
     V2                                          V3
[1,] NA                                          NA
[2,] "Gross Domestic Product - product measure" NA
[3,] "Market"                                    NA
[4,] "Private"                                   "Central Government Sector"
     V4                          V5            V6
[1,] NA                          NA            NA
[2,] NA                          NA            NA
[3,] NA                          NA            "Non-Market"
[4,] "Local Government Sector" "All Sectors" "Private"
     V7
[1,] NA
[2,] NA
[3,] NA
[4,] "Central Government Sector"
> cursub
                                      V2
"Gross Domestic Product - product measure"
                                      V3
                                      NA
                                      V4
                                      NA
                                      V5
                                      NA
                                      V6
                                      NA
                                      V7
                                      NA
> currow[curcols]
                                      V2
"Gross Domestic Product - product measure"
                                      V3
                                      NA
                                      V4
                                      NA
                                      V5
                                      NA
                                      V6
                                      NA
                                      V7
```

```
                                      NA
> cursub
     V14      V15      V16      V17      V18      V19
"Output"       NA       NA       NA       NA       NA
> currow[curcols]
     V14      V15      V16      V17      V18      V19
"Output"       NA       NA       NA       NA       NA
> cursub
                        V26                      V27
"Intermediate Consumption"                       NA
                        V28                      V29
                         NA                       NA
                        V30                      V31
                         NA                       NA
> currow[curcols]
                        V26                      V27
"Intermediate Consumption"                       NA
                        V28                      V29
                         NA                       NA
                        V30                      V31
                         NA                       NA
> cursub
      V2       V3       V4       V5
"Market"       NA       NA       NA
> currow[curcols]
      V2       V3       V4       V5
"Market"       NA       NA       NA
> cursub
          V6           V7           V8           V9
"Non-Market"           NA           NA           NA
> currow[curcols]
          V6           V7           V8           V9
"Non-Market"           NA           NA           NA
> cursub
                           V10                          V11
"Total Market and Non-Market"                           NA
                           V12                          V13
                            NA                           NA
> currow[curcols]
                           V10                          V11
"Total Market and Non-Market"                           NA
                           V12                          V13
                            NA                           NA
> cursub
     V14      V15      V16      V17
"Market"       NA       NA       NA
> currow[curcols]
     V14      V15      V16      V17
"Market"       NA       NA       NA
> cursub
         V18          V19          V20          V21
"Non-Market"           NA           NA           NA
> currow[curcols]
         V18          V19          V20          V21
"Non-Market"           NA           NA           NA
> cursub
                        V22                          V23
```

```
"Total Market and Non-Market"                                NA
                          V24                               V25
                           NA                                NA
> currow[curcols]
                          V22                               V23
"Total Market and Non-Market"                                NA
                          V24                               V25
                           NA                                NA
> cursub
     V26      V27      V28      V29
"Market"       NA       NA       NA
> currow[curcols]
     V26      V27      V28      V29
"Market"       NA       NA       NA
> cursub
         V30          V31          V32          V33
"Non-Market"           NA           NA           NA
> currow[curcols]
         V30          V31          V32          V33
"Non-Market"           NA           NA           NA
> cursub
                          V34                               V35
"Total Market and Non-Market"                                NA
                          V36                               V37
                           NA                                NA
> currow[curcols]
                          V34                               V35
"Total Market and Non-Market"                                NA
                          V36                               V37
                           NA                                NA
> cursub
                         V2                                V3
                 "Private" "Central Government Sector"
                         V4                                V5
  "Local Government Sector"               "All Sectors"
> currow[curcols]
                         V2                                V3
                 "Private" "Central Government Sector"
                         V4                                V5
  "Local Government Sector"               "All Sectors"
> cursub
                         V6                                V7
                 "Private" "Central Government Sector"
                         V8                                V9
  "Local Government Sector"               "All Sectors"
> currow[curcols]
                         V6                                V7
                 "Private" "Central Government Sector"
                         V8                                V9
  "Local Government Sector"               "All Sectors"
> cursub
                        V10                               V11
                 "Private" "Central Government Sector"
                        V12                               V13
  "Local Government Sector"               "All Sectors"
> currow[curcols]
                        V10                               V11
```

```
                "Private" "Central Government Sector"
                     V12                          V13
  "Local Government Sector"               "All Sectors"
> cursub
                     V14                          V15
                "Private" "Central Government Sector"
                     V16                          V17
  "Local Government Sector"               "All Sectors"
> currow[curcols]
                     V14                          V15
                "Private" "Central Government Sector"
                     V16                          V17
  "Local Government Sector"               "All Sectors"
> cursub
                     V18                          V19
                "Private" "Central Government Sector"
                     V20                          V21
  "Local Government Sector"               "All Sectors"
> currow[curcols]
                     V18                          V19
                "Private" "Central Government Sector"
                     V20                          V21
  "Local Government Sector"               "All Sectors"
> cursub
                     V22                          V23
                "Private" "Central Government Sector"
                     V24                          V25
  "Local Government Sector"               "All Sectors"
> currow[curcols]
                     V22                          V23
                "Private" "Central Government Sector"
                     V24                          V25
  "Local Government Sector"               "All Sectors"
> cursub
                     V26                          V27
                "Private" "Central Government Sector"
                     V28                          V29
  "Local Government Sector"               "All Sectors"
> currow[curcols]
                     V26                          V27
                "Private" "Central Government Sector"
                     V28                          V29
  "Local Government Sector"               "All Sectors"
> cursub
                     V30                          V31
                "Private" "Central Government Sector"
                     V32                          V33
  "Local Government Sector"               "All Sectors"
> currow[curcols]
                     V30                          V31
                "Private" "Central Government Sector"
                     V32                          V33
  "Local Government Sector"               "All Sectors"
> cursub
                     V34                          V35
                "Private" "Central Government Sector"
                     V36                          V37
```

```
  "Local Government Sector"               "All Sectors"
> currow[curcols]
                      V34                         V35
                "Private" "Central Government Sector"
                      V36                         V37
  "Local Government Sector"               "All Sectors"
> matColLabel
     V2                               V3
[1,] NA                               NA
[2,] "Gross Domestic Product - product measure" NA
[3,] "Market"                         NA
[4,] "Private"                        "Central Government Sector"
     V4                        V5            V6
[1,] NA                        NA            NA
[2,] NA                        NA            NA
[3,] NA                        NA            "Non-Market"
[4,] "Local Government Sector" "All Sectors" "Private"
     V7
[1,] NA
[2,] NA
[3,] NA
[4,] "Central Government Sector"
> matColLabel
     V2                               V3
[1,] NA                               NA
[2,] "Gross Domestic Product - product measure" NA
[3,] "Market"                         NA
[4,] "Private"                        "Central Government Sector"
     V4                        V5            V6
[1,] NA                        NA            NA
[2,] NA                        NA            NA
[3,] NA                        NA            "Non-Market"
[4,] "Local Government Sector" "All Sectors" "Private"
     V7
[1,] NA
[2,] NA
[3,] NA
[4,] "Central Government Sector"
> matColLabel
     V2                               V3
[1,] NA                               NA
[2,] "Gross Domestic Product - product measure" NA
[3,] "Market"                         NA
[4,] "Private"                        "Central Government Sector"
     V4                        V5            V6
[1,] NA                        NA            NA
[2,] NA                        NA            NA
[3,] NA                        NA            "Non-Market"
[4,] "Local Government Sector" "All Sectors" "Private"
     V7
[1,] NA
[2,] NA
[3,] NA
[4,] "Central Government Sector"
> res
$`Gross Domestic Product - product measure`
$`Gross Domestic Product - product measure`$rows
```

```
 [1]  1  2  3  4  5  6  7  8  9 10 11 12

$`Gross Domestic Product - product measure`$cols
[1] 3 4


$Output
$Output$rows
 [1] 13 14 15 16 17 18 19 20 21 22 23 24

$Output$cols
[1] 3 4


$`Intermediate Consumption`
$`Intermediate Consumption`$rows
 [1] 25 26 27 28 29 30 31 32 33 34 35 36

$`Intermediate Consumption`$cols
[1] 3 4


> res
$Market
$Market$rows
[1] 1 2 3 4

$Market$cols
[1] 4


$`Non-Market`
$`Non-Market`$rows
[1] 5 6 7 8

$`Non-Market`$cols
[1] 4


$`Total Market and Non-Market`
$`Total Market and Non-Market`$rows
[1]  9 10 11 12

$`Total Market and Non-Market`$cols
[1] 4


> plist
$rows
[1] 1 2 3 4

$cols
[1] 4

> res
                  Private Central Government Sector   Local Government Sector
                                                1                           2                           3
```

```
             All Sectors
                       4
> plist
$rows
[1] 5 6 7 8

$cols
[1] 4

> res
                 Private Central Government Sector   Local Government Sector
                       5                         6                         7
             All Sectors
                       8
> plist
$rows
[1]  9 10 11 12

$cols
[1] 4

> res
                 Private Central Government Sector   Local Government Sector
                       9                        10                        11
             All Sectors
                      12
> res
$Market
$Market$rows
[1] 13 14 15 16

$Market$cols
[1] 4


$`Non-Market`
$`Non-Market`$rows
[1] 17 18 19 20

$`Non-Market`$cols
[1] 4


$`Total Market and Non-Market`
$`Total Market and Non-Market`$rows
[1] 21 22 23 24

$`Total Market and Non-Market`$cols
[1] 4


> plist
$rows
[1] 13 14 15 16

$cols
[1] 4
```

```
> res
                  Private Central Government Sector   Local Government Sector
                       13                          14                          15
              All Sectors
                       16
> plist
$rows
[1] 17 18 19 20

$cols
[1] 4

> res
                  Private Central Government Sector   Local Government Sector
                       17                          18                          19
              All Sectors
                       20
> plist
$rows
[1] 21 22 23 24

$cols
[1] 4

> res
                  Private Central Government Sector   Local Government Sector
                       21                          22                          23
              All Sectors
                       24
> res
$Market
$Market$rows
[1] 25 26 27 28

$Market$cols
[1] 4


$`Non-Market`
$`Non-Market`$rows
[1] 29 30 31 32

$`Non-Market`$cols
[1] 4


$`Total Market and Non-Market`
$`Total Market and Non-Market`$rows
[1] 33 34 35 36

$`Total Market and Non-Market`$cols
[1] 4


> plist
$rows
```

```
[1] 25 26 27 28

$cols
[1] 4

> res
                  Private Central Government Sector   Local Government Sector
                       25                         26                         27
              All Sectors
                       28
> plist
$rows
[1] 29 30 31 32

$cols
[1] 4

> res
                  Private Central Government Sector   Local Government Sector
                       29                         30                         31
              All Sectors
                       32
> plist
$rows
[1] 33 34 35 36

$cols
[1] 4

> res
                  Private Central Government Sector   Local Government Sector
                       33                         34                         35
              All Sectors
                       36
> plist
                  Private Central Government Sector   Local Government Sector
                        1                          2                          3
              All Sectors
                        4
> matData
     V2      V3     V4    V5      V6    V7
[1,] "5200"  "568"  "155" "5923"  "58"  "660"
[2,] "5993"  "649"  "169" "6811"  "68"  "738"
[3,] "7013"  "723"  "183" "7919"  "78"  "880"
[4,] "7636"  "750"  "202" "8588"  "90"  "1049"
[5,] "8526"  "840"  "231" "9597"  "108" "1264"
[6,] "10450" "1179" "295" "11924" "130" "1431"
> datbit
     V2      V3     V4    V5
[1,] "5200"  "568"  "155" "5923"
[2,] "5993"  "649"  "169" "6811"
[3,] "7013"  "723"  "183" "7919"
[4,] "7636"  "750"  "202" "8588"
[5,] "8526"  "840"  "231" "9597"
[6,] "10450" "1179" "295" "11924"
> plist
                  Private Central Government Sector   Local Government Sector
```

```
                     5                          6                          7
             All Sectors
                     8
> matData
     V2      V3     V4    V5      V6    V7
[1,] "5200"  "568"  "155" "5923"  "58"  "660"
[2,] "5993"  "649"  "169" "6811"  "68"  "738"
[3,] "7013"  "723"  "183" "7919"  "78"  "880"
[4,] "7636"  "750"  "202" "8588"  "90"  "1049"
[5,] "8526"  "840"  "231" "9597"  "108" "1264"
[6,] "10450" "1179" "295" "11924" "130" "1431"
> datbit
     V6    V7     V8    V9
[1,] "58"  "660"  "100" "818"
[2,] "68"  "738"  "118" "924"
[3,] "78"  "880"  "136" "1093"
[4,] "90"  "1049" "164" "1303"
[5,] "108" "1264" "202" "1574"
[6,] "130" "1431" "213" "1774"
> plist
                 Private Central Government Sector   Local Government Sector
                     9                         10                         11
             All Sectors
                    12
> matData
     V2      V3     V4    V5      V6    V7
[1,] "5200"  "568"  "155" "5923"  "58"  "660"
[2,] "5993"  "649"  "169" "6811"  "68"  "738"
[3,] "7013"  "723"  "183" "7919"  "78"  "880"
[4,] "7636"  "750"  "202" "8588"  "90"  "1049"
[5,] "8526"  "840"  "231" "9597"  "108" "1264"
[6,] "10450" "1179" "295" "11924" "130" "1431"
> datbit
     V10     V11    V12   V13
[1,] "5258"  "1227" "255" "6740"
[2,] "6062"  "1387" "287" "7735"
[3,] "7091"  "1604" "318" "9013"
[4,] "7727"  "1798" "366" "9891"
[5,] "8634"  "2104" "433" "11171"
[6,] "10580" "2611" "508" "13698"
> plist
                 Private Central Government Sector   Local Government Sector
                    13                         14                         15
             All Sectors
                    16
> matData
     V2      V3     V4    V5      V6    V7
[1,] "5200"  "568"  "155" "5923"  "58"  "660"
[2,] "5993"  "649"  "169" "6811"  "68"  "738"
[3,] "7013"  "723"  "183" "7919"  "78"  "880"
[4,] "7636"  "750"  "202" "8588"  "90"  "1049"
[5,] "8526"  "840"  "231" "9597"  "108" "1264"
[6,] "10450" "1179" "295" "11924" "130" "1431"
> datbit
     V14     V15    V16   V17
[1,] "10994" "1005" "357" "12355"
[2,] "13021" "1111" "391" "14523"
```

```
[3,] "15370" "1232" "429" "17031"
[4,] "17264" "1453" "492" "19210"
[5,] "20239" "1784" "574" "22597"
[6,] "25121" "2239" "733" "28092"
> plist
                 Private Central Government Sector   Local Government Sector
                      17                          18                        19
             All Sectors
                      20
> matData
     V2      V3     V4    V5      V6    V7
[1,] "5200"  "568"  "155" "5923"  "58"  "660"
[2,] "5993"  "649"  "169" "6811"  "68"  "738"
[3,] "7013"  "723"  "183" "7919"  "78"  "880"
[4,] "7636"  "750"  "202" "8588"  "90"  "1049"
[5,] "8526"  "840"  "231" "9597"  "108" "1264"
[6,] "10450" "1179" "295" "11924" "130" "1431"
> datbit
     V18   V19    V20   V21
[1,] "113" "884"  "179" "1176"
[2,] "129" "987"  "223" "1339"
[3,] "145" "1147" "262" "1554"
[4,] "170" "1384" "328" "1882"
[5,] "196" "1673" "392" "2261"
[6,] "245" "1918" "415" "2578"
> plist
                 Private Central Government Sector   Local Government Sector
                      21                          22                        23
             All Sectors
                      24
> matData
     V2      V3     V4    V5      V6    V7
[1,] "5200"  "568"  "155" "5923"  "58"  "660"
[2,] "5993"  "649"  "169" "6811"  "68"  "738"
[3,] "7013"  "723"  "183" "7919"  "78"  "880"
[4,] "7636"  "750"  "202" "8588"  "90"  "1049"
[5,] "8526"  "840"  "231" "9597"  "108" "1264"
[6,] "10450" "1179" "295" "11924" "130" "1431"
> datbit
     V22     V23    V24    V25
[1,] "11107" "1889" "535"  "13531"
[2,] "13149" "2098" "614"  "15862"
[3,] "15515" "2379" "691"  "18586"
[4,] "17434" "2837" "820"  "21092"
[5,] "20435" "3457" "966"  "24859"
[6,] "25366" "4157" "1147" "30670"
> plist
                 Private Central Government Sector   Local Government Sector
                      25                          26                        27
             All Sectors
                      28
> matData
     V2      V3     V4    V5      V6    V7
[1,] "5200"  "568"  "155" "5923"  "58"  "660"
[2,] "5993"  "649"  "169" "6811"  "68"  "738"
[3,] "7013"  "723"  "183" "7919"  "78"  "880"
[4,] "7636"  "750"  "202" "8588"  "90"  "1049"
```

```
[5,] "8526"  "840"  "231" "9597"  "108" "1264"
[6,] "10450" "1179" "295" "11924" "130" "1431"
> datbit
     V26     V27    V28   V29
[1,] "5793"  "437"  "202" "6432"
[2,] "7027"  "463"  "222" "7712"
[3,] "8357"  "508"  "247" "9112"
[4,] "9628"  "704"  "290" "10622"
[5,] "11713" "944"  "343" "13000"
[6,] "14671" "1060" "437" "16168"
> plist
                  Private Central Government Sector   Local Government Sector
                       29                          30                         31
              All Sectors
                       32
> matData
     V2      V3     V4    V5      V6    V7
[1,] "5200"  "568"  "155" "5923"  "58"  "660"
[2,] "5993"  "649"  "169" "6811"  "68"  "738"
[3,] "7013"  "723"  "183" "7919"  "78"  "880"
[4,] "7636"  "750"  "202" "8588"  "90"  "1049"
[5,] "8526"  "840"  "231" "9597"  "108" "1264"
[6,] "10450" "1179" "295" "11924" "130" "1431"
> datbit
     V30   V31   V32   V33
[1,] "56"  "224" "78"  "359"
[2,] "60"  "249" "106" "415"
[3,] "67"  "267" "127" "461"
[4,] "80"  "335" "164" "579"
[5,] "88"  "409" "190" "687"
[6,] "116" "487" "202" "804"
> plist
                  Private Central Government Sector   Local Government Sector
                       33                          34                         35
              All Sectors
                       36
> matData
     V2      V3     V4    V5      V6    V7
[1,] "5200"  "568"  "155" "5923"  "58"  "660"
[2,] "5993"  "649"  "169" "6811"  "68"  "738"
[3,] "7013"  "723"  "183" "7919"  "78"  "880"
[4,] "7636"  "750"  "202" "8588"  "90"  "1049"
[5,] "8526"  "840"  "231" "9597"  "108" "1264"
[6,] "10450" "1179" "295" "11924" "130" "1431"
> datbit
     V34     V35    V36   V37
[1,] "5849"  "662"  "280" "6791"
[2,] "7088"  "712"  "327" "8126"
[3,] "8424"  "775"  "373" "9573"
[4,] "9708"  "1039" "454" "11201"
[5,] "11801" "1353" "533" "13687"
[6,] "14786" "1547" "639" "16972"
> colplist
$`Gross Domestic Product - product measure`
+ Market (1, 3)
- + Private (1, 4)
- + Central Government Sector (2, 4)
```

```
- + Local Government Sector (3, 4)
- + All Sectors (4, 4)
+ Non-Market (5, 3)
- + Private (5, 4)
- + Central Government Sector (6, 4)
- + Local Government Sector (7, 4)
- + All Sectors (8, 4)
+ Total Market and Non-Market (9, 3)
- + Private (9, 4)
- + Central Government Sector (10, 4)
- + Local Government Sector (11, 4)
- + All Sectors (12, 4)

$Output
+ Market (13, 3)
- + Private (13, 4)
- + Central Government Sector (14, 4)
- + Local Government Sector (15, 4)
- + All Sectors (16, 4)
+ Non-Market (17, 3)
- + Private (17, 4)
- + Central Government Sector (18, 4)
- + Local Government Sector (19, 4)
- + All Sectors (20, 4)
+ Total Market and Non-Market (21, 3)
- + Private (21, 4)
- + Central Government Sector (22, 4)
- + Local Government Sector (23, 4)
- + All Sectors (24, 4)

$`Intermediate Consumption`
+ Market (25, 3)
- + Private (25, 4)
- + Central Government Sector (26, 4)
- + Local Government Sector (27, 4)
- + All Sectors (28, 4)
+ Non-Market (29, 3)
- + Private (29, 4)
- + Central Government Sector (30, 4)
- + Local Government Sector (31, 4)
- + All Sectors (32, 4)
+ Total Market and Non-Market (33, 3)
- + Private (33, 4)
- + Central Government Sector (34, 4)
- + Local Government Sector (35, 4)
- + All Sectors (36, 4)

> res
                                  UNKNOWN UNKNOWN UNKNOWN Private
1 Gross Domestic Product - product measure  Market    1972    5200
2 Gross Domestic Product - product measure  Market    1973    5993
3 Gross Domestic Product - product measure  Market    1974    7013
4 Gross Domestic Product - product measure  Market    1975    7636
5 Gross Domestic Product - product measure  Market    1976    8526
6 Gross Domestic Product - product measure  Market    1977   10450
  Central Government Sector Local Government Sector All Sectors
1                       568                     155        5923
```

2	649	169	6811
3	723	183	7919
4	750	202	8588
5	840	231	9597
6	1179	295	11924

8.6 StatsNZLabourForce.csv

	1	2	3	4	5	6	7	8	9	10	11	12	13
1	Labour Force Status by Sex by Sing/Comb Ethnic Group (Qrtly−Mar/Jun/Sep/Dec)												
2		Male											
3		European Only								Maori Only			
4		Persons En	Persons Un	Not in Labo	Working Ag	Labour Forc	Unemploym	Employmer	Total Labou	Persons En	Persons Un	Not in Labo	Working Ag
5	2007Q4	856	20	280	1,156	76	2	74	876	71	6	28	105
6	2008Q1	863	25	284	1,172	76	3	74	888	69	8	31	108
7	2008Q2	850	26	281	1,157	76	3	74	876	67	6	27	100
8	2008Q3	840	30	286	1,155	75	3	73	869	72	9	31	111
9	2008Q4	855	30	275	1,159	76	3	74	884	76	8	28	113
10	2009Q1	845	35	279	1,160	76	4	73	880	75	8	36	120
11	2009Q2	832	35	280	1,146	76	4	73	866	74	10	33	117
12	2009Q3	813	42	290	1,146	75	5	71	856	71	11	36	118
13	2009Q4	831	40	277	1,148	76	5	72	871	72	14	33	118
14	2010Q1	822	36	283	1,142	75	4	72	859	72	11	35	118
15	2010Q2	825	40	290	1,155	75	5	71	865	72	14	34	119
16	2010Q3	837	31	287	1,155	75	4	72	868	70	14	34	117
17	2010Q4	838	40	277	1,155	76	4	73	878	71	14	36	122
18	2011Q1	830	37	281	1,148	76	4	72	866	71	14	35	120
19	2011Q2	839	41	279	1,159	76	5	72	880	67	10	37	115
20	2011Q3	830	35	280	1,145	76	4	72	865	70	13	35	118
21	2011Q4	842	35	278	1,154	76	4	73	877	69	13	36	118
22	2012Q1	843	43	283	1,169	76	5	72	886	72	11	35	117
23	2012Q2	837	38	296	1,172	75	4	71	875	66	11	33	110
24	2012Q3	833	38	298	1,169	74	4	71	871	67	13	33	113
25	2012Q4	833	41	298	1,173	75	5	71	874	63	12	35	111
26	2013Q1	832	36	295	1,162	75	4	72	868	70	12	38	120
27	Table information:												
28	Units:												
29	Persons Employed in Labour Force: Number, Magnitude = Thousands												
30	Persons Unemployed in Labour Force: Number, Magnitude = Thousands												
31	Not in Labour Force: Number, Magnitude = Thousands												
32	Working Age Population: Number, Magnitude = Thousands												
33	Labour Force Participation Rate: Percent, Magnitude = Units												
34	Unemployment Rate: Percent, Magnitude = Units												
35	Employment Rate: Percent, Magnitude = Units												
36	Total Labour Force: Number, Magnitude = Thousands												
37	Footnotes:												
38													
39	Symbols:												
40	.. figure not available												
41	C: Confidential												
42	E: Early Estimate												
43	P: Provisional												

```
> rowData
[1]  5 26
> colData
[1]   2 241
> rowslist
$label
[1] 1 2 3 4

$data
 [1]  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26

> colslist
$label
[1] 1

$data
  [1]   2   3   4   5   6   7   8   9  10  11  12  13  14  15  16  17  18  19
 [19]  20  21  22  23  24  25  26  27  28  29  30  31  32  33  34  35  36  37
 [37]  38  39  40  41  42  43  44  45  46  47  48  49  50  51  52  53  54  55
 [55]  56  57  58  59  60  61  62  63  64  65  66  67  68  69  70  71  72  73
 [73]  74  75  76  77  78  79  80  81  82  83  84  85  86  87  88  89  90  91
 [91]  92  93  94  95  96  97  98  99 100 101 102 103 104 105 106 107 108 109
[109] 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127
[127] 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145
[145] 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163
[163] 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181
```

```
[181] 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199
[199] 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217
[217] 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235
[235] 236 237 238 239 240 241

> plist
$rows
 [1]  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22

$cols
[1] 1

> res
2007Q4 2008Q1 2008Q2 2008Q3 2008Q4 2009Q1
     1      2      3      4      5      6
> rowplist
2007Q4 2008Q1 2008Q2 2008Q3 2008Q4 2009Q1
     1      2      3      4      5      6
> rowvecs
     [,1]
[1,] "2007Q4"
[2,] "2008Q1"
[3,] "2008Q2"
[4,] "2008Q3"
[5,] "2008Q4"
[6,] "2009Q1"
> matColLabel
     V2                                  V3
[1,] NA                                  NA
[2,] "Male"                              NA
[3,] "European Only"                     NA
[4,] "Persons Employed in Labour Force" "Persons Unemployed in Labour Force"
     V4                     V5
[1,] NA                     NA
[2,] NA                     NA
[3,] NA                     NA
[4,] "Not in Labour Force" "Working Age Population"
     V6                                 V7
[1,] NA                                 NA
[2,] NA                                 NA
[3,] NA                                 NA
[4,] "Labour Force Participation Rate" "Unemployment Rate"
> cursub
    V2     V3     V4     V5     V6     V7
"Male"     NA     NA     NA     NA     NA
> currow[curcols]
    V2     V3     V4     V5     V6     V7
"Male"     NA     NA     NA     NA     NA
> cursub
     V82      V83      V84      V85      V86      V87
"Female"       NA       NA       NA       NA       NA
> currow[curcols]
     V82      V83      V84      V85      V86      V87
"Female"       NA       NA       NA       NA       NA
> cursub
              V162               V163               V164               V165
"Total Both Sexes"                 NA                 NA                 NA
```

```
             V166              V167
               NA                NA
> currow[curcols]
             V162              V163              V164              V165
"Total Both Sexes"                NA                NA                NA
             V166              V167
               NA                NA
> cursub
            V2             V3             V4             V5             V6
"European Only"             NA             NA             NA             NA
            V7
            NA
> currow[curcols]
            V2             V3             V4             V5             V6
"European Only"             NA             NA             NA             NA
            V7
            NA
> cursub
         V10          V11          V12          V13          V14          V15
"Maori Only"           NA           NA           NA           NA           NA
> currow[curcols]
         V10          V11          V12          V13          V14          V15
"Maori Only"           NA           NA           NA           NA           NA
> cursub
                  V18                  V19                  V20
"Pacific Peoples Only"                   NA                   NA
                  V21                  V22                  V23
                   NA                   NA                   NA
> currow[curcols]
                  V18                  V19                  V20
"Pacific Peoples Only"                   NA                   NA
                  V21                  V22                  V23
                   NA                   NA                   NA
> cursub
         V26          V27          V28          V29          V30          V31
"Asian Only"           NA           NA           NA           NA           NA
> currow[curcols]
         V26          V27          V28          V29          V30          V31
"Asian Only"           NA           NA           NA           NA           NA
> cursub
         V34          V35          V36          V37          V38          V39
"MELAA Only"           NA           NA           NA           NA           NA
> currow[curcols]
         V34          V35          V36          V37          V38          V39
"MELAA Only"           NA           NA           NA           NA           NA
> cursub
                  V42                  V43                  V44
"Other Ethnicity Only"                   NA                   NA
                  V45                  V46                  V47
                   NA                   NA                   NA
> currow[curcols]
                  V42                  V43                  V44
"Other Ethnicity Only"                   NA                   NA
                  V45                  V46                  V47
                   NA                   NA                   NA
> cursub
            V50            V51            V52            V53
```

```
"European/Maori"               NA               NA               NA
             V54              V55
              NA               NA
> currow[curcols]
             V50              V51              V52              V53
"European/Maori"               NA               NA               NA
             V54              V55
              NA               NA
> cursub
                                     V58
"Two or More Groups Not Elsewhere Included"
                                     V59
                                      NA
                                     V60
                                      NA
                                     V61
                                      NA
                                     V62
                                      NA
                                     V63
                                      NA
> currow[curcols]
                                     V58
"Two or More Groups Not Elsewhere Included"
                                     V59
                                      NA
                                     V60
                                      NA
                                     V61
                                      NA
                                     V62
                                      NA
                                     V63
                                      NA
> cursub
                  V66                  V67                  V68
"Residual Categories"                   NA                   NA
                  V69                  V70                  V71
                   NA                   NA                   NA
> currow[curcols]
                  V66                  V67                  V68
"Residual Categories"                   NA                   NA
                  V69                  V70                  V71
                   NA                   NA                   NA
> cursub
                      V74                  V75                  V76
"Total All Ethnic Groups"                   NA                   NA
                      V77                  V78                  V79
                       NA                   NA                   NA
> currow[curcols]
                      V74                  V75                  V76
"Total All Ethnic Groups"                   NA                   NA
                      V77                  V78                  V79
                       NA                   NA                   NA
> cursub
           V82              V83              V84              V85              V86
"European Only"               NA               NA               NA               NA
```

```
           V87
            NA
> currow[curcols]
           V82             V83             V84             V85             V86
"European Only"              NA              NA              NA              NA
           V87
            NA
> cursub
        V90          V91          V92          V93          V94          V95
"Maori Only"           NA           NA           NA           NA           NA
> currow[curcols]
        V90          V91          V92          V93          V94          V95
"Maori Only"           NA           NA           NA           NA           NA
> cursub
                  V98                   V99                  V100
"Pacific Peoples Only"                    NA                    NA
                 V101                  V102                  V103
                   NA                    NA                    NA
> currow[curcols]
                  V98                   V99                  V100
"Pacific Peoples Only"                    NA                    NA
                 V101                  V102                  V103
                   NA                    NA                    NA
> cursub
       V106         V107         V108         V109         V110         V111
"Asian Only"           NA           NA           NA           NA           NA
> currow[curcols]
       V106         V107         V108         V109         V110         V111
"Asian Only"           NA           NA           NA           NA           NA
> cursub
       V114         V115         V116         V117         V118         V119
"MELAA Only"           NA           NA           NA           NA           NA
> currow[curcols]
       V114         V115         V116         V117         V118         V119
"MELAA Only"           NA           NA           NA           NA           NA
> cursub
                  V122                  V123                  V124
"Other Ethnicity Only"                    NA                    NA
                 V125                  V126                  V127
                   NA                    NA                    NA
> currow[curcols]
                  V122                  V123                  V124
"Other Ethnicity Only"                    NA                    NA
                 V125                  V126                  V127
                   NA                    NA                    NA
> cursub
           V130             V131             V132             V133
"European/Maori"               NA               NA               NA
           V134             V135
             NA               NA
> currow[curcols]
           V130             V131             V132             V133
"European/Maori"               NA               NA               NA
           V134             V135
             NA               NA
> cursub
                                  V138
```

```
"Two or More Groups Not Elsewhere Included"
                                     V139
                                       NA
                                     V140
                                       NA
                                     V141
                                       NA
                                     V142
                                       NA
                                     V143
                                       NA
> currow[curcols]
                                     V138
"Two or More Groups Not Elsewhere Included"
                                     V139
                                       NA
                                     V140
                                       NA
                                     V141
                                       NA
                                     V142
                                       NA
                                     V143
                                       NA
> cursub
                 V146                  V147                  V148
"Residual Categories"                    NA                    NA
                 V149                  V150                  V151
                   NA                    NA                    NA
> currow[curcols]
                 V146                  V147                  V148
"Residual Categories"                    NA                    NA
                 V149                  V150                  V151
                   NA                    NA                    NA
> cursub
                     V154                      V155                      V156
"Total All Ethnic Groups"                        NA                        NA
                     V157                      V158                      V159
                       NA                        NA                        NA
> currow[curcols]
                     V154                      V155                      V156
"Total All Ethnic Groups"                        NA                        NA
                     V157                      V158                      V159
                       NA                        NA                        NA
> cursub
           V162            V163            V164            V165            V166
"European Only"              NA              NA              NA              NA
           V167
             NA
> currow[curcols]
           V162            V163            V164            V165            V166
"European Only"              NA              NA              NA              NA
           V167
             NA
> cursub
        V170         V171         V172         V173         V174         V175
"Maori Only"           NA           NA           NA           NA           NA
```

```
> currow[curcols]
       V170         V171         V172         V173         V174         V175
"Maori Only"           NA           NA           NA           NA           NA
> cursub
                  V178                    V179                    V180
"Pacific Peoples Only"                    NA                      NA
                  V181                    V182                    V183
                    NA                    NA                      NA
> currow[curcols]
                  V178                    V179                    V180
"Pacific Peoples Only"                    NA                      NA
                  V181                    V182                    V183
                    NA                    NA                      NA
> cursub
       V186         V187         V188         V189         V190         V191
"Asian Only"           NA           NA           NA           NA           NA
> currow[curcols]
       V186         V187         V188         V189         V190         V191
"Asian Only"           NA           NA           NA           NA           NA
> cursub
       V194         V195         V196         V197         V198         V199
"MELAA Only"           NA           NA           NA           NA           NA
> currow[curcols]
       V194         V195         V196         V197         V198         V199
"MELAA Only"           NA           NA           NA           NA           NA
> cursub
                  V202                    V203                    V204
"Other Ethnicity Only"                    NA                      NA
                  V205                    V206                    V207
                    NA                    NA                      NA
> currow[curcols]
                  V202                    V203                    V204
"Other Ethnicity Only"                    NA                      NA
                  V205                    V206                    V207
                    NA                    NA                      NA
> cursub
           V210            V211            V212            V213
"European/Maori"              NA              NA              NA
           V214            V215
             NA              NA
> currow[curcols]
           V210            V211            V212            V213
"European/Maori"              NA              NA              NA
           V214            V215
             NA              NA
> cursub
                                      V218
"Two or More Groups Not Elsewhere Included"
                                      V219
                                        NA
                                      V220
                                        NA
                                      V221
                                        NA
                                      V222
                                        NA
                                      V223
```

```
                                    NA
> currow[curcols]
                                  V218
"Two or More Groups Not Elsewhere Included"
                                  V219
                                    NA
                                  V220
                                    NA
                                  V221
                                    NA
                                  V222
                                    NA
                                  V223
                                    NA
> cursub
                V226                  V227                  V228
"Residual Categories"                   NA                    NA
                V229                  V230                  V231
                  NA                    NA                    NA
> currow[curcols]
                V226                  V227                  V228
"Residual Categories"                   NA                    NA
                V229                  V230                  V231
                  NA                    NA                    NA
> cursub
                    V234                    V235                    V236
"Total All Ethnic Groups"                     NA                      NA
                    V237                    V238                    V239
                      NA                      NA                      NA
> currow[curcols]
                    V234                    V235                    V236
"Total All Ethnic Groups"                     NA                      NA
                    V237                    V238                    V239
                      NA                      NA                      NA
> cursub
                                 V2                                  V3
  "Persons Employed in Labour Force" "Persons Unemployed in Labour Force"
                                 V4                                  V5
              "Not in Labour Force"            "Working Age Population"
                                 V6                                  V7
   "Labour Force Participation Rate"                 "Unemployment Rate"
> currow[curcols]
                                 V2                                  V3
  "Persons Employed in Labour Force" "Persons Unemployed in Labour Force"
                                 V4                                  V5
              "Not in Labour Force"            "Working Age Population"
                                 V6                                  V7
   "Labour Force Participation Rate"                 "Unemployment Rate"
> cursub
                                V10                                 V11
  "Persons Employed in Labour Force" "Persons Unemployed in Labour Force"
                                V12                                 V13
              "Not in Labour Force"            "Working Age Population"
                                V14                                 V15
   "Labour Force Participation Rate"                 "Unemployment Rate"
> currow[curcols]
                                V10                                 V11
```

```
  "Persons Employed in Labour Force" "Persons Unemployed in Labour Force"
                                 V12                                   V13
              "Not in Labour Force"             "Working Age Population"
                                 V14                                   V15
   "Labour Force Participation Rate"                  "Unemployment Rate"
> cursub
                                 V18                                   V19
  "Persons Employed in Labour Force" "Persons Unemployed in Labour Force"
                                 V20                                   V21
              "Not in Labour Force"             "Working Age Population"
                                 V22                                   V23
   "Labour Force Participation Rate"                  "Unemployment Rate"
> currow[curcols]
                                 V18                                   V19
  "Persons Employed in Labour Force" "Persons Unemployed in Labour Force"
                                 V20                                   V21
              "Not in Labour Force"             "Working Age Population"
                                 V22                                   V23
   "Labour Force Participation Rate"                  "Unemployment Rate"
> cursub
                                 V26                                   V27
  "Persons Employed in Labour Force" "Persons Unemployed in Labour Force"
                                 V28                                   V29
              "Not in Labour Force"             "Working Age Population"
                                 V30                                   V31
   "Labour Force Participation Rate"                  "Unemployment Rate"
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  "Persons Employed in Labour Force" "Persons Unemployed in Labour Force"
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                                V76                                 V77
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                               V84                                   V85
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                               V92                                   V93
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             "Not in Labour Force"             "Working Age Population"
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 "Labour Force Participation Rate"                 "Unemployment Rate"
> currow[curcols]
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"Persons Employed in Labour Force" "Persons Unemployed in Labour Force"
                                V132                                V133
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 "Labour Force Participation Rate"                 "Unemployment Rate"
> cursub
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             "Not in Labour Force"            "Working Age Population"
                                V142                                V143
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                                V150                                  V151
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                                V158                                  V159
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                                V164                                  V165
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                                V166                                  V167
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                                V164                                  V165
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                                V166                                  V167
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              "Not in Labour Force"             "Working Age Population"
                                V174                                  V175
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  "Persons Employed in Labour Force" "Persons Unemployed in Labour Force"
                                V172                                  V173
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                                V174                                  V175
   "Labour Force Participation Rate"                  "Unemployment Rate"
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  "Persons Employed in Labour Force" "Persons Unemployed in Labour Force"
                               V180                                V181
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                               V182                                V183
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                               V190                                V191
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                               V188                                V189
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                               V190                                V191
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                               V196                                V197
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                               V198                                V199
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                               V204                                V205
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                               V206                                V207
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  "Persons Employed in Labour Force" "Persons Unemployed in Labour Force"
                               V204                                V205
              "Not in Labour Force"            "Working Age Population"
                               V206                                V207
   "Labour Force Participation Rate"                 "Unemployment Rate"
> cursub
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                                V210                                V211
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                                V212                                V213
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                                V214                                V215
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                                V212                                V213
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                                V214                                V215
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                                V222                                V223
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                                V220                                V221
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                                V230                                V231
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                                V228                                V229
              "Not in Labour Force"             "Working Age Population"
                                V230                                V231
   "Labour Force Participation Rate"                  "Unemployment Rate"
> cursub
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                                V236                                V237
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                                V238                                V239
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> currow[curcols]
                                V234                                V235
  "Persons Employed in Labour Force" "Persons Unemployed in Labour Force"
                                V236                                V237
              "Not in Labour Force"             "Working Age Population"
                                V238                                V239
   "Labour Force Participation Rate"                  "Unemployment Rate"
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     V2                                 V3
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[2,] "Male"                              NA
[3,] "European Only"                     NA
[4,] "Persons Employed in Labour Force" "Persons Unemployed in Labour Force"
     V4                     V5
[1,] NA                     NA
[2,] NA                     NA
[3,] NA                     NA
[4,] "Not in Labour Force" "Working Age Population"
     V6                                  V7
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[2,] NA                                  NA
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     V2                                  V3
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[3,] "European Only"                     NA
[4,] "Persons Employed in Labour Force" "Persons Unemployed in Labour Force"
     V4                     V5
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[2,] NA                     NA
[3,] NA                     NA
[4,] "Not in Labour Force" "Working Age Population"
     V6                                  V7
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[3,] "European Only"                     NA
[4,] "Persons Employed in Labour Force" "Persons Unemployed in Labour Force"
     V4                     V5
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[2,] NA                     NA
[3,] NA                     NA
[4,] "Not in Labour Force" "Working Age Population"
     V6                                  V7
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[2,] NA                                  NA
[3,] NA                                  NA
[4,] "Labour Force Participation Rate" "Unemployment Rate"
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[39] 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137
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$Female$cols
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$`Total Both Sexes`
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[39] 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217
[58] 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236
[77] 237 238 239 240

$`Total Both Sexes`$cols
[1] 3 4


> res
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$`European Only`$rows
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$`European Only`$cols
[1] 4


$`Maori Only`
$`Maori Only`$rows
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$`Maori Only`$cols
[1] 4


$`Pacific Peoples Only`
$`Pacific Peoples Only`$rows
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$`Pacific Peoples Only`$cols
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$`Asian Only`
$`Asian Only`$rows
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$`Asian Only`$cols
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$`MELAA Only`
$`MELAA Only`$rows
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$`MELAA Only`$cols
[1] 4


$`Other Ethnicity Only`
$`Other Ethnicity Only`$rows
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$`Other Ethnicity Only`$cols
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> plist
$rows
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$cols
[1] 4

> res
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                                 1                                   2
              Not in Labour Force             Working Age Population
                                 3                                   4
   Labour Force Participation Rate                  Unemployment Rate
                                 5                                   6
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$rows
[1]  9 10 11 12 13 14 15 16

$cols
[1] 4

> res
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                                 9                                  10
              Not in Labour Force             Working Age Population
                                11                                  12
   Labour Force Participation Rate                  Unemployment Rate
                                13                                  14
> plist
$rows
[1] 17 18 19 20 21 22 23 24

$cols
[1] 4

> res
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                                17                                  18
              Not in Labour Force             Working Age Population
                                19                                  20
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   Labour Force Participation Rate                   Unemployment Rate
                                21                                   22
> plist
$rows
[1] 25 26 27 28 29 30 31 32

$cols
[1] 4

> res
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                                25                                   26
              Not in Labour Force             Working Age Population
                                27                                   28
   Labour Force Participation Rate                   Unemployment Rate
                                29                                   30
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$cols
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> res
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              Not in Labour Force             Working Age Population
                                35                                   36
   Labour Force Participation Rate                   Unemployment Rate
                                37                                   38
> plist
$rows
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$cols
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> res
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                                41                                   42
              Not in Labour Force             Working Age Population
                                43                                   44
   Labour Force Participation Rate                   Unemployment Rate
                                45                                   46
> plist
$rows
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> res
  Persons Employed in Labour Force Persons Unemployed in Labour Force
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              Not in Labour Force             Working Age Population
                                51                                   52
   Labour Force Participation Rate                   Unemployment Rate
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                                53                                  54
> plist
$rows
[1] 57 58 59 60 61 62 63 64

$cols
[1] 4

> res
  Persons Employed in Labour Force Persons Unemployed in Labour Force
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              Not in Labour Force             Working Age Population
                                59                                  60
   Labour Force Participation Rate                  Unemployment Rate
                                61                                  62
> plist
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$cols
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> res
  Persons Employed in Labour Force Persons Unemployed in Labour Force
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              Not in Labour Force             Working Age Population
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   Labour Force Participation Rate                  Unemployment Rate
                                69                                  70
> plist
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$cols
[1] 4

> res
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                                73                                  74
              Not in Labour Force             Working Age Population
                                75                                  76
   Labour Force Participation Rate                  Unemployment Rate
                                77                                  78
> res
$`European Only`
$`European Only`$rows
[1] 81 82 83 84 85 86 87 88

$`European Only`$cols
[1] 4


$`Maori Only`
$`Maori Only`$rows
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$`Maori Only`$cols
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[1] 4


$`Pacific Peoples Only`
$`Pacific Peoples Only`$rows
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$`Pacific Peoples Only`$cols
[1] 4


$`Asian Only`
$`Asian Only`$rows
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$`Asian Only`$cols
[1] 4


$`MELAA Only`
$`MELAA Only`$rows
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$`MELAA Only`$cols
[1] 4


$`Other Ethnicity Only`
$`Other Ethnicity Only`$rows
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$`Other Ethnicity Only`$cols
[1] 4


> plist
$rows
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$cols
[1] 4

> res
  Persons Employed in Labour Force Persons Unemployed in Labour Force
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              Not in Labour Force             Working Age Population
                                 83                                 84
   Labour Force Participation Rate                  Unemployment Rate
                                 85                                 86
> plist
$rows
[1] 89 90 91 92 93 94 95 96

$cols
[1] 4

> res
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  Persons Employed in Labour Force Persons Unemployed in Labour Force
                                89                                 90
              Not in Labour Force             Working Age Population
                                91                                 92
   Labour Force Participation Rate                  Unemployment Rate
                                93                                 94
> plist
$rows
[1]  97  98  99 100 101 102 103 104

$cols
[1] 4

> res
  Persons Employed in Labour Force Persons Unemployed in Labour Force
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              Not in Labour Force             Working Age Population
                                99                                100
   Labour Force Participation Rate                  Unemployment Rate
                               101                                102
> plist
$rows
[1] 105 106 107 108 109 110 111 112

$cols
[1] 4

> res
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                               105                                106
              Not in Labour Force             Working Age Population
                               107                                108
   Labour Force Participation Rate                  Unemployment Rate
                               109                                110
> plist
$rows
[1] 113 114 115 116 117 118 119 120

$cols
[1] 4

> res
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                               113                                114
              Not in Labour Force             Working Age Population
                               115                                116
   Labour Force Participation Rate                  Unemployment Rate
                               117                                118
> plist
$rows
[1] 121 122 123 124 125 126 127 128

$cols
[1] 4

> res
  Persons Employed in Labour Force Persons Unemployed in Labour Force
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                                121                                 122
              Not in Labour Force             Working Age Population
                                123                                 124
   Labour Force Participation Rate                  Unemployment Rate
                                125                                 126
> plist
$rows
[1] 129 130 131 132 133 134 135 136

$cols
[1] 4

> res
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                                129                                 130
              Not in Labour Force             Working Age Population
                                131                                 132
   Labour Force Participation Rate                  Unemployment Rate
                                133                                 134
> plist
$rows
[1] 137 138 139 140 141 142 143 144

$cols
[1] 4

> res
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                                137                                 138
              Not in Labour Force             Working Age Population
                                139                                 140
   Labour Force Participation Rate                  Unemployment Rate
                                141                                 142
> plist
$rows
[1] 145 146 147 148 149 150 151 152

$cols
[1] 4

> res
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                                145                                 146
              Not in Labour Force             Working Age Population
                                147                                 148
   Labour Force Participation Rate                  Unemployment Rate
                                149                                 150
> plist
$rows
[1] 153 154 155 156 157 158 159 160

$cols
[1] 4

> res
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                                153                                 154
```

```
              Not in Labour Force                Working Age Population
                                155                                   156
   Labour Force Participation Rate                     Unemployment Rate
                                157                                   158
> res
$`European Only`
$`European Only`$rows
[1] 161 162 163 164 165 166 167 168

$`European Only`$cols
[1] 4


$`Maori Only`
$`Maori Only`$rows
[1] 169 170 171 172 173 174 175 176

$`Maori Only`$cols
[1] 4


$`Pacific Peoples Only`
$`Pacific Peoples Only`$rows
[1] 177 178 179 180 181 182 183 184

$`Pacific Peoples Only`$cols
[1] 4


$`Asian Only`
$`Asian Only`$rows
[1] 185 186 187 188 189 190 191 192

$`Asian Only`$cols
[1] 4


$`MELAA Only`
$`MELAA Only`$rows
[1] 193 194 195 196 197 198 199 200

$`MELAA Only`$cols
[1] 4


$`Other Ethnicity Only`
$`Other Ethnicity Only`$rows
[1] 201 202 203 204 205 206 207 208

$`Other Ethnicity Only`$cols
[1] 4


> plist
$rows
[1] 161 162 163 164 165 166 167 168
```

```
$cols
[1] 4

> res
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                               161                                 162
              Not in Labour Force             Working Age Population
                               163                                 164
   Labour Force Participation Rate                  Unemployment Rate
                               165                                 166
> plist
$rows
[1] 169 170 171 172 173 174 175 176

$cols
[1] 4

> res
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                               169                                 170
              Not in Labour Force             Working Age Population
                               171                                 172
   Labour Force Participation Rate                  Unemployment Rate
                               173                                 174
> plist
$rows
[1] 177 178 179 180 181 182 183 184

$cols
[1] 4

> res
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                               177                                 178
              Not in Labour Force             Working Age Population
                               179                                 180
   Labour Force Participation Rate                  Unemployment Rate
                               181                                 182
> plist
$rows
[1] 185 186 187 188 189 190 191 192

$cols
[1] 4

> res
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                               185                                 186
              Not in Labour Force             Working Age Population
                               187                                 188
   Labour Force Participation Rate                  Unemployment Rate
                               189                                 190
> plist
$rows
[1] 193 194 195 196 197 198 199 200

$cols
```

```
[1] 4

> res
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                               193                                 194
              Not in Labour Force             Working Age Population
                               195                                 196
   Labour Force Participation Rate                  Unemployment Rate
                               197                                 198
> plist
$rows
[1] 201 202 203 204 205 206 207 208

$cols
[1] 4

> res
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                               201                                 202
              Not in Labour Force             Working Age Population
                               203                                 204
   Labour Force Participation Rate                  Unemployment Rate
                               205                                 206
> plist
$rows
[1] 209 210 211 212 213 214 215 216

$cols
[1] 4

> res
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                               209                                 210
              Not in Labour Force             Working Age Population
                               211                                 212
   Labour Force Participation Rate                  Unemployment Rate
                               213                                 214
> plist
$rows
[1] 217 218 219 220 221 222 223 224

$cols
[1] 4

> res
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                               217                                 218
              Not in Labour Force             Working Age Population
                               219                                 220
   Labour Force Participation Rate                  Unemployment Rate
                               221                                 222
> plist
$rows
[1] 225 226 227 228 229 230 231 232

$cols
[1] 4
```

```
> res
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                                225                                 226
              Not in Labour Force             Working Age Population
                                227                                 228
   Labour Force Participation Rate                  Unemployment Rate
                                229                                 230
> plist
$rows
[1] 233 234 235 236 237 238 239 240

$cols
[1] 4

> res
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                                233                                 234
              Not in Labour Force             Working Age Population
                                235                                 236
   Labour Force Participation Rate                  Unemployment Rate
                                237                                 238
> plist
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                                  1                                   2
              Not in Labour Force             Working Age Population
                                  3                                   4
   Labour Force Participation Rate                  Unemployment Rate
                                  5                                   6
> matData
     V2      V3     V4      V5       V6     V7
[1,] "855.8" "20.0" "280.0" "1155.8" "75.8" "2.3"
[2,] "863.0" "25.4" "283.5" "1171.9" "75.8" "2.9"
[3,] "850.1" "26.0" "280.7" "1156.8" "75.7" "3.0"
[4,] "839.6" "29.8" "285.9" "1155.3" "75.2" "3.4"
[5,] "854.8" "29.5" "274.7" "1158.9" "76.3" "3.3"
[6,] "845.0" "35.4" "279.4" "1159.8" "75.9" "4.0"
> datbit
     V2      V3     V4      V5       V6     V7
[1,] "855.8" "20.0" "280.0" "1155.8" "75.8" "2.3"
[2,] "863.0" "25.4" "283.5" "1171.9" "75.8" "2.9"
[3,] "850.1" "26.0" "280.7" "1156.8" "75.7" "3.0"
[4,] "839.6" "29.8" "285.9" "1155.3" "75.2" "3.4"
[5,] "854.8" "29.5" "274.7" "1158.9" "76.3" "3.3"
[6,] "845.0" "35.4" "279.4" "1159.8" "75.9" "4.0"
> plist
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                                  9                                  10
              Not in Labour Force             Working Age Population
                                 11                                  12
   Labour Force Participation Rate                  Unemployment Rate
                                 13                                  14
> matData
     V2      V3     V4      V5       V6     V7
[1,] "855.8" "20.0" "280.0" "1155.8" "75.8" "2.3"
[2,] "863.0" "25.4" "283.5" "1171.9" "75.8" "2.9"
[3,] "850.1" "26.0" "280.7" "1156.8" "75.7" "3.0"
```

```
[4,] "839.6" "29.8" "285.9" "1155.3" "75.2" "3.4"
[5,] "854.8" "29.5" "274.7" "1158.9" "76.3" "3.3"
[6,] "845.0" "35.4" "279.4" "1159.8" "75.9" "4.0"
> datbit
     V10    V11   V12    V13     V14    V15
[1,] "71.1" "6.1" "28.1" "105.3" "73.4" "7.9"
[2,] "69.1" "7.5" "31.4" "107.9" "71.0" "9.7"
[3,] "67.2" "5.7" "27.4" "100.2" "72.7" "7.8"
[4,] "71.7" "8.7" "30.7" "111.1" "72.3" "10.8"
[5,] "76.1" "8.5" "28.5" "113.1" "74.8" "10.0"
[6,] "75.4" "8.4" "35.7" "119.5" "70.1" "10.1"
> plist
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                                 17                                 18
              Not in Labour Force             Working Age Population
                                 19                                 20
   Labour Force Participation Rate                  Unemployment Rate
                                 21                                 22
> matData
     V2      V3     V4      V5       V6     V7
[1,] "855.8" "20.0" "280.0" "1155.8" "75.8" "2.3"
[2,] "863.0" "25.4" "283.5" "1171.9" "75.8" "2.9"
[3,] "850.1" "26.0" "280.7" "1156.8" "75.7" "3.0"
[4,] "839.6" "29.8" "285.9" "1155.3" "75.2" "3.4"
[5,] "854.8" "29.5" "274.7" "1158.9" "76.3" "3.3"
[6,] "845.0" "35.4" "279.4" "1159.8" "75.9" "4.0"
> datbit
     V18    V19   V20    V21    V22    V23
[1,] "42.8" "1.5" "18.9" "63.2" "70.1" "3.5"
[2,] "41.1" "3.4" "18.1" "62.6" "71.1" "7.6"
[3,] "42.2" "2.4" "18.0" "62.5" "71.2" "5.3"
[4,] "45.2" "3.3" "19.4" "67.9" "71.5" "6.9"
[5,] "47.7" "3.3" "17.5" "68.4" "74.5" "6.4"
[6,] "41.9" "7.3" "18.4" "67.6" "72.8" "14.8"
> plist
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                                 25                                 26
              Not in Labour Force             Working Age Population
                                 27                                 28
   Labour Force Participation Rate                  Unemployment Rate
                                 29                                 30
> matData
     V2      V3     V4      V5       V6     V7
[1,] "855.8" "20.0" "280.0" "1155.8" "75.8" "2.3"
[2,] "863.0" "25.4" "283.5" "1171.9" "75.8" "2.9"
[3,] "850.1" "26.0" "280.7" "1156.8" "75.7" "3.0"
[4,] "839.6" "29.8" "285.9" "1155.3" "75.2" "3.4"
[5,] "854.8" "29.5" "274.7" "1158.9" "76.3" "3.3"
[6,] "845.0" "35.4" "279.4" "1159.8" "75.9" "4.0"
> datbit
     V26     V27   V28    V29     V30    V31
[1,] "95.9"  "5.2" "32.2" "133.2" "75.9" "5.1"
[2,] "90.9"  "3.8" "36.4" "131.2" "72.2" "4.1"
[3,] "98.3"  "4.2" "44.5" "146.9" "69.7" "4.1"
[4,] "101.3" "3.8" "41.0" "146.0" "71.9" "3.6"
[5,] "106.4" "6.2" "33.9" "146.6" "76.9" "5.5"
[6,] "99.7"  "6.6" "40.1" "146.4" "72.6" "6.2"
```

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> plist
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                                33                                 34
              Not in Labour Force             Working Age Population
                                35                                 36
   Labour Force Participation Rate                  Unemployment Rate
                                37                                 38
> matData
     V2      V3     V4      V5       V6     V7
[1,] "855.8" "20.0" "280.0" "1155.8" "75.8" "2.3"
[2,] "863.0" "25.4" "283.5" "1171.9" "75.8" "2.9"
[3,] "850.1" "26.0" "280.7" "1156.8" "75.7" "3.0"
[4,] "839.6" "29.8" "285.9" "1155.3" "75.2" "3.4"
[5,] "854.8" "29.5" "274.7" "1158.9" "76.3" "3.3"
[6,] "845.0" "35.4" "279.4" "1159.8" "75.9" "4.0"
> datbit
     V34   V35   V36   V37    V38    V39
[1,] "9.8" NA    "3.5" "14.2" "75.0" NA
[2,] "9.3" NA    "4.9" "14.7" "66.4" NA
[3,] "9.6" "2.0" "3.3" "14.9" "77.7" "17.2"
[4,] "8.1" NA    "6.7" "15.5" "57.1" NA
[5,] "8.4" NA    "4.7" "13.7" "66.0" NA
[6,] "8.1" NA    "5.0" "14.1" "64.7" NA
> plist
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                                41                                 42
              Not in Labour Force             Working Age Population
                                43                                 44
   Labour Force Participation Rate                  Unemployment Rate
                                45                                 46
> matData
     V2      V3     V4      V5       V6     V7
[1,] "855.8" "20.0" "280.0" "1155.8" "75.8" "2.3"
[2,] "863.0" "25.4" "283.5" "1171.9" "75.8" "2.9"
[3,] "850.1" "26.0" "280.7" "1156.8" "75.7" "3.0"
[4,] "839.6" "29.8" "285.9" "1155.3" "75.2" "3.4"
[5,] "854.8" "29.5" "274.7" "1158.9" "76.3" "3.3"
[6,] "845.0" "35.4" "279.4" "1159.8" "75.9" "4.0"
> datbit
     V42    V43 V44   V45    V46    V47
[1,] "5.9"  NA  "1.1" "7.2"  "84.1" NA
[2,] "6.8"  NA  "1.9" "9.2"  "79.8" NA
[3,] "11.2" NA  "2.9" "14.6" "80.0" NA
[4,] "10.5" NA  "4.1" "14.7" "71.9" NA
[5,] "13.5" NA  "4.1" "18.1" "77.1" NA
[6,] "16.6" NA  "5.4" "22.3" "75.6" NA
> plist
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                                49                                 50
              Not in Labour Force             Working Age Population
                                51                                 52
   Labour Force Participation Rate                  Unemployment Rate
                                53                                 54
> matData
     V2      V3     V4      V5       V6     V7
[1,] "855.8" "20.0" "280.0" "1155.8" "75.8" "2.3"
[2,] "863.0" "25.4" "283.5" "1171.9" "75.8" "2.9"
```

```
[3,] "850.1" "26.0" "280.7" "1156.8" "75.7" "3.0"
[4,] "839.6" "29.8" "285.9" "1155.3" "75.2" "3.4"
[5,] "854.8" "29.5" "274.7" "1158.9" "76.3" "3.3"
[6,] "845.0" "35.4" "279.4" "1159.8" "75.9" "4.0"
> datbit
     V50    V51   V52    V53    V54    V55
[1,] "60.1" "4.7" "13.9" "78.8" "82.4" "7.3"
[2,] "56.9" "4.4" "19.6" "80.9" "75.8" "7.2"
[3,] "64.3" "5.2" "18.9" "88.4" "78.6" "7.5"
[4,] "57.2" "4.6" "18.2" "80.0" "77.3" "7.5"
[5,] "57.9" "4.0" "17.2" "79.2" "78.2" "6.4"
[6,] "49.2" "6.3" "17.0" "72.4" "76.6" "11.3"
> plist
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                                 57                                 58
              Not in Labour Force             Working Age Population
                                 59                                 60
   Labour Force Participation Rate                  Unemployment Rate
                                 61                                 62
> matData
     V2      V3     V4      V5       V6     V7
[1,] "855.8" "20.0" "280.0" "1155.8" "75.8" "2.3"
[2,] "863.0" "25.4" "283.5" "1171.9" "75.8" "2.9"
[3,] "850.1" "26.0" "280.7" "1156.8" "75.7" "3.0"
[4,] "839.6" "29.8" "285.9" "1155.3" "75.2" "3.4"
[5,] "854.8" "29.5" "274.7" "1158.9" "76.3" "3.3"
[6,] "845.0" "35.4" "279.4" "1159.8" "75.9" "4.0"
> datbit
     V58    V59   V60   V61    V62    V63
[1,] "28.2" "1.2" "7.1" "36.5" "80.5" "4.0"
[2,] "17.0" "1.6" "5.4" "24.0" "77.6" "8.7"
[3,] "17.2" NA    "5.5" "23.5" "76.7" "4.8"
[4,] "18.1" NA    "5.0" "23.7" "79.0" "3.1"
[5,] "17.6" "1.2" "4.5" "23.3" "80.7" "6.5"
[6,] "16.3" "2.4" "5.8" "24.5" "76.2" "12.6"
> plist
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                                 65                                 66
              Not in Labour Force             Working Age Population
                                 67                                 68
   Labour Force Participation Rate                  Unemployment Rate
                                 69                                 70
> matData
     V2      V3     V4      V5       V6     V7
[1,] "855.8" "20.0" "280.0" "1155.8" "75.8" "2.3"
[2,] "863.0" "25.4" "283.5" "1171.9" "75.8" "2.9"
[3,] "850.1" "26.0" "280.7" "1156.8" "75.7" "3.0"
[4,] "839.6" "29.8" "285.9" "1155.3" "75.2" "3.4"
[5,] "854.8" "29.5" "274.7" "1158.9" "76.3" "3.3"
[6,] "845.0" "35.4" "279.4" "1159.8" "75.9" "4.0"
> datbit
     V66   V67 V68   V69   V70    V71
[1,] "7.3" NA  "1.7" "9.3" "81.8" NA
[2,] "4.1" NA  "2.6" "6.9" "62.4" NA
[3,] "2.7" NA  "3.0" "5.7" "46.8" NA
[4,] "2.9" NA  NA    "3.3" "88.8" NA
[5,] "1.6" NA  NA    "2.2" "81.6" NA
```

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[6,] "2.2" NA  NA    "3.1" "88.9" NA
> plist
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                                73                                74
              Not in Labour Force             Working Age Population
                                75                                76
   Labour Force Participation Rate                  Unemployment Rate
                                77                                78
> matData
     V2      V3     V4      V5       V6     V7
[1,] "855.8" "20.0" "280.0" "1155.8" "75.8" "2.3"
[2,] "863.0" "25.4" "283.5" "1171.9" "75.8" "2.9"
[3,] "850.1" "26.0" "280.7" "1156.8" "75.7" "3.0"
[4,] "839.6" "29.8" "285.9" "1155.3" "75.2" "3.4"
[5,] "854.8" "29.5" "274.7" "1158.9" "76.3" "3.3"
[6,] "845.0" "35.4" "279.4" "1159.8" "75.9" "4.0"
> datbit
     V74      V75    V76     V77      V78    V79
[1,] "1176.9" "40.1" "386.6" "1603.6" "75.9" "3.3"
[2,] "1158.3" "47.4" "403.7" "1609.4" "74.9" "3.9"
[3,] "1162.7" "46.6" "404.2" "1613.5" "74.9" "3.9"
[4,] "1154.7" "51.5" "411.4" "1617.6" "74.6" "4.3"
[5,] "1184.1" "53.8" "385.5" "1623.4" "76.3" "4.3"
[6,] "1154.4" "68.2" "407.1" "1629.7" "75.0" "5.6"
> plist
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                                81                                82
              Not in Labour Force             Working Age Population
                                83                                84
   Labour Force Participation Rate                  Unemployment Rate
                                85                                86
> matData
     V2      V3     V4      V5       V6     V7
[1,] "855.8" "20.0" "280.0" "1155.8" "75.8" "2.3"
[2,] "863.0" "25.4" "283.5" "1171.9" "75.8" "2.9"
[3,] "850.1" "26.0" "280.7" "1156.8" "75.7" "3.0"
[4,] "839.6" "29.8" "285.9" "1155.3" "75.2" "3.4"
[5,] "854.8" "29.5" "274.7" "1158.9" "76.3" "3.3"
[6,] "845.0" "35.4" "279.4" "1159.8" "75.9" "4.0"
> datbit
     V82     V83    V84     V85      V86    V87
[1,] "763.3" "16.6" "441.6" "1221.6" "63.8" "2.1"
[2,] "737.5" "24.5" "456.5" "1218.5" "62.5" "3.2"
[3,] "744.6" "19.8" "442.5" "1206.9" "63.3" "2.6"
[4,] "746.3" "21.5" "439.2" "1207.0" "63.6" "2.8"
[5,] "754.8" "23.6" "437.1" "1215.4" "64.0" "3.0"
[6,] "735.5" "29.6" "441.3" "1206.5" "63.4" "3.9"
> plist
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                                89                                90
              Not in Labour Force             Working Age Population
                                91                                92
   Labour Force Participation Rate                  Unemployment Rate
                                93                                94
> matData
     V2      V3     V4      V5       V6     V7
[1,] "855.8" "20.0" "280.0" "1155.8" "75.8" "2.3"
```

```
[2,] "863.0" "25.4" "283.5" "1171.9" "75.8" "2.9"
[3,] "850.1" "26.0" "280.7" "1156.8" "75.7" "3.0"
[4,] "839.6" "29.8" "285.9" "1155.3" "75.2" "3.4"
[5,] "854.8" "29.5" "274.7" "1158.9" "76.3" "3.3"
[6,] "845.0" "35.4" "279.4" "1159.8" "75.9" "4.0"
> datbit
     V90    V91   V92    V93     V94    V95
[1,] "62.7" "6.5" "49.2" "118.4" "58.4" "9.4"
[2,] "60.5" "7.3" "54.9" "122.8" "55.3" "10.8"
[3,] "59.0" "5.4" "47.1" "111.5" "57.8" "8.4"
[4,] "62.0" "5.6" "50.5" "118.0" "57.2" "8.2"
[5,] "65.7" "6.9" "46.8" "119.3" "60.8" "9.5"
[6,] "65.4" "8.4" "51.9" "125.6" "58.7" "11.4"
> plist
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                                97                                 98
              Not in Labour Force             Working Age Population
                                99                                100
   Labour Force Participation Rate                  Unemployment Rate
                               101                                102
> matData
     V2      V3     V4      V5       V6     V7
[1,] "855.8" "20.0" "280.0" "1155.8" "75.8" "2.3"
[2,] "863.0" "25.4" "283.5" "1171.9" "75.8" "2.9"
[3,] "850.1" "26.0" "280.7" "1156.8" "75.7" "3.0"
[4,] "839.6" "29.8" "285.9" "1155.3" "75.2" "3.4"
[5,] "854.8" "29.5" "274.7" "1158.9" "76.3" "3.3"
[6,] "845.0" "35.4" "279.4" "1159.8" "75.9" "4.0"
> datbit
     V98    V99   V100   V101   V102   V103
[1,] "36.9" "2.8" "31.4" "71.2" "55.9" "7.1"
[2,] "33.4" "3.7" "33.3" "70.4" "52.7" "10.0"
[3,] "34.9" "3.2" "31.7" "69.8" "54.6" "8.3"
[4,] "39.0" "3.6" "33.9" "76.5" "55.7" "8.5"
[5,] "37.7" "4.0" "32.0" "73.7" "56.6" "9.5"
[6,] "35.1" "4.9" "37.9" "77.8" "51.3" "12.2"
> plist
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                               105                                106
              Not in Labour Force             Working Age Population
                               107                                108
   Labour Force Participation Rate                  Unemployment Rate
                               109                                110
> matData
     V2      V3     V4      V5       V6     V7
[1,] "855.8" "20.0" "280.0" "1155.8" "75.8" "2.3"
[2,] "863.0" "25.4" "283.5" "1171.9" "75.8" "2.9"
[3,] "850.1" "26.0" "280.7" "1156.8" "75.7" "3.0"
[4,] "839.6" "29.8" "285.9" "1155.3" "75.2" "3.4"
[5,] "854.8" "29.5" "274.7" "1158.9" "76.3" "3.3"
[6,] "845.0" "35.4" "279.4" "1159.8" "75.9" "4.0"
> datbit
     V106   V107  V108   V109    V110   V111
[1,] "76.2" "4.7" "64.1" "145.0" "55.8" "5.8"
[2,] "79.0" "6.6" "70.7" "156.3" "54.8" "7.7"
[3,] "87.6" "5.9" "69.5" "163.0" "57.4" "6.3"
[4,] "86.4" "5.4" "68.4" "160.3" "57.3" "5.9"
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[5,] "89.9" "6.9" "66.5" "163.3" "59.3" "7.2"
[6,] "93.6" "7.3" "69.2" "170.1" "59.3" "7.2"
> plist
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                                113                                 114
              Not in Labour Force             Working Age Population
                                115                                 116
   Labour Force Participation Rate                  Unemployment Rate
                                117                                 118
> matData
     V2      V3     V4      V5       V6     V7
[1,] "855.8" "20.0" "280.0" "1155.8" "75.8" "2.3"
[2,] "863.0" "25.4" "283.5" "1171.9" "75.8" "2.9"
[3,] "850.1" "26.0" "280.7" "1156.8" "75.7" "3.0"
[4,] "839.6" "29.8" "285.9" "1155.3" "75.2" "3.4"
[5,] "854.8" "29.5" "274.7" "1158.9" "76.3" "3.3"
[6,] "845.0" "35.4" "279.4" "1159.8" "75.9" "4.0"
> datbit
     V114  V115  V116  V117   V118   V119
[1,] "4.3" NA    "8.2" "13.2" "37.9" NA
[2,] "5.0" "1.2" "7.4" "13.6" "45.4" "19.0"
[3,] "6.6" "1.0" "8.9" "16.5" "45.8" "13.4"
[4,] "6.8" NA    "9.5" "17.2" "44.7" NA
[5,] "4.2" NA    "6.4" "11.5" "43.9" NA
[6,] "4.3" NA    "7.0" "12.0" "41.9" NA
> plist
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                                121                                 122
              Not in Labour Force             Working Age Population
                                123                                 124
   Labour Force Participation Rate                  Unemployment Rate
                                125                                 126
> matData
     V2      V3     V4      V5       V6     V7
[1,] "855.8" "20.0" "280.0" "1155.8" "75.8" "2.3"
[2,] "863.0" "25.4" "283.5" "1171.9" "75.8" "2.9"
[3,] "850.1" "26.0" "280.7" "1156.8" "75.7" "3.0"
[4,] "839.6" "29.8" "285.9" "1155.3" "75.2" "3.4"
[5,] "854.8" "29.5" "274.7" "1158.9" "76.3" "3.3"
[6,] "845.0" "35.4" "279.4" "1159.8" "75.9" "4.0"
> datbit
     V122   V123  V124  V125   V126   V127
[1,] "5.7"  NA    "1.9" "7.6"  "74.6" NA
[2,] "6.6"  NA    "4.2" "10.9" "61.4" NA
[3,] "8.8"  "1.1" "6.6" "16.6" "60.0" "11.4"
[4,] "11.4" NA    "6.9" "19.0" "63.7" NA
[5,] "12.6" NA    "7.6" "20.9" "63.5" NA
[6,] "14.6" NA    "7.6" "22.7" "66.5" NA
> plist
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                                129                                 130
              Not in Labour Force             Working Age Population
                                131                                 132
   Labour Force Participation Rate                  Unemployment Rate
                                133                                 134
> matData
     V2      V3     V4      V5       V6     V7
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[1,] "855.8" "20.0" "280.0" "1155.8" "75.8" "2.3"
[2,] "863.0" "25.4" "283.5" "1171.9" "75.8" "2.9"
[3,] "850.1" "26.0" "280.7" "1156.8" "75.7" "3.0"
[4,] "839.6" "29.8" "285.9" "1155.3" "75.2" "3.4"
[5,] "854.8" "29.5" "274.7" "1158.9" "76.3" "3.3"
[6,] "845.0" "35.4" "279.4" "1159.8" "75.9" "4.0"
> datbit
     V130   V131  V132   V133   V134   V135
[1,] "54.1" "2.4" "28.2" "84.7" "66.7" "4.2"
[2,] "55.3" "4.2" "27.2" "86.7" "68.7" "7.1"
[3,] "59.8" "3.8" "34.3" "97.8" "65.0" "5.9"
[4,] "57.2" "3.5" "31.5" "92.2" "65.9" "5.7"
[5,] "60.3" "4.9" "25.6" "90.8" "71.7" "7.5"
[6,] "51.6" "6.9" "26.2" "84.7" "69.0" "11.8"
> plist
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                                137                                138
              Not in Labour Force             Working Age Population
                                139                                140
   Labour Force Participation Rate                  Unemployment Rate
                                141                                142
> matData
     V2      V3     V4      V5       V6     V7
[1,] "855.8" "20.0" "280.0" "1155.8" "75.8" "2.3"
[2,] "863.0" "25.4" "283.5" "1171.9" "75.8" "2.9"
[3,] "850.1" "26.0" "280.7" "1156.8" "75.7" "3.0"
[4,] "839.6" "29.8" "285.9" "1155.3" "75.2" "3.4"
[5,] "854.8" "29.5" "274.7" "1158.9" "76.3" "3.3"
[6,] "845.0" "35.4" "279.4" "1159.8" "75.9" "4.0"
> datbit
     V138   V139  V140   V141   V142   V143
[1,] "21.5" "1.8" "13.0" "36.3" "64.1" "7.7"
[2,] "15.6" NA    "9.2"  "25.3" "63.8" NA
[3,] "17.5" NA    "10.4" "28.6" "63.6" NA
[4,] "16.4" "1.1" "8.8"  "26.4" "66.5" "6.5"
[5,] "16.4" "1.1" "10.1" "27.6" "63.3" "6.4"
[6,] "17.7" "2.2" "10.1" "30.0" "66.4" "11.1"
> plist
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                                145                                146
              Not in Labour Force             Working Age Population
                                147                                148
   Labour Force Participation Rate                  Unemployment Rate
                                149                                150
> matData
     V2      V3     V4      V5       V6     V7
[1,] "855.8" "20.0" "280.0" "1155.8" "75.8" "2.3"
[2,] "863.0" "25.4" "283.5" "1171.9" "75.8" "2.9"
[3,] "850.1" "26.0" "280.7" "1156.8" "75.7" "3.0"
[4,] "839.6" "29.8" "285.9" "1155.3" "75.2" "3.4"
[5,] "854.8" "29.5" "274.7" "1158.9" "76.3" "3.3"
[6,] "845.0" "35.4" "279.4" "1159.8" "75.9" "4.0"
> datbit
     V146  V147 V148  V149   V150   V151
[1,] "5.8" NA   "4.0" "10.1" "60.0" NA
[2,] "5.6" NA   "2.7" "8.6"  "69.0" NA
[3,] "2.8" NA   "3.3" "6.1"  "45.9" NA
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```
[4,] "3.3" NA   NA    "3.9"  "86.4" NA
[5,] "2.3" NA   NA    "3.1"  "75.7" NA
[6,] NA    NA   NA    "1.7"  "63.3" NA
> plist
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                                153                                 154
              Not in Labour Force             Working Age Population
                                155                                 156
   Labour Force Participation Rate                  Unemployment Rate
                                157                                 158
> matData
     V2      V3     V4      V5       V6     V7
[1,] "855.8" "20.0" "280.0" "1155.8" "75.8" "2.3"
[2,] "863.0" "25.4" "283.5" "1171.9" "75.8" "2.9"
[3,] "850.1" "26.0" "280.7" "1156.8" "75.7" "3.0"
[4,] "839.6" "29.8" "285.9" "1155.3" "75.2" "3.4"
[5,] "854.8" "29.5" "274.7" "1158.9" "76.3" "3.3"
[6,] "845.0" "35.4" "279.4" "1159.8" "75.9" "4.0"
> datbit
     V154     V155   V156    V157     V158   V159
[1,] "1030.6" "35.7" "641.7" "1708.0" "62.4" "3.3"
[2,] "998.6"  "48.6" "666.1" "1713.3" "61.1" "4.6"
[3,] "1021.6" "40.8" "654.4" "1716.8" "61.9" "3.8"
[4,] "1028.9" "42.4" "649.2" "1720.5" "62.3" "4.0"
[5,] "1043.9" "49.0" "633.0" "1725.8" "63.3" "4.5"
[6,] "1018.6" "60.6" "651.8" "1731.1" "62.3" "5.6"
> plist
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                                161                                 162
              Not in Labour Force             Working Age Population
                                163                                 164
   Labour Force Participation Rate                  Unemployment Rate
                                165                                 166
> matData
     V2      V3     V4      V5       V6     V7
[1,] "855.8" "20.0" "280.0" "1155.8" "75.8" "2.3"
[2,] "863.0" "25.4" "283.5" "1171.9" "75.8" "2.9"
[3,] "850.1" "26.0" "280.7" "1156.8" "75.7" "3.0"
[4,] "839.6" "29.8" "285.9" "1155.3" "75.2" "3.4"
[5,] "854.8" "29.5" "274.7" "1158.9" "76.3" "3.3"
[6,] "845.0" "35.4" "279.4" "1159.8" "75.9" "4.0"
> datbit
     V162     V163   V164    V165     V166   V167
[1,] "1619.1" "36.6" "721.7" "2377.4" "69.6" "2.2"
[2,] "1600.5" "49.9" "740.0" "2390.5" "69.0" "3.0"
[3,] "1594.7" "45.7" "723.2" "2363.6" "69.4" "2.8"
[4,] "1585.9" "51.3" "725.1" "2362.3" "69.3" "3.1"
[5,] "1609.6" "53.1" "711.7" "2374.3" "70.0" "3.2"
[6,] "1580.5" "65.0" "720.8" "2366.2" "69.5" "3.9"
> plist
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                                169                                 170
              Not in Labour Force             Working Age Population
                                171                                 172
   Labour Force Participation Rate                  Unemployment Rate
                                173                                 174
> matData
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     V2      V3     V4      V5       V6     V7
[1,] "855.8" "20.0" "280.0" "1155.8" "75.8" "2.3"
[2,] "863.0" "25.4" "283.5" "1171.9" "75.8" "2.9"
[3,] "850.1" "26.0" "280.7" "1156.8" "75.7" "3.0"
[4,] "839.6" "29.8" "285.9" "1155.3" "75.2" "3.4"
[5,] "854.8" "29.5" "274.7" "1158.9" "76.3" "3.3"
[6,] "845.0" "35.4" "279.4" "1159.8" "75.9" "4.0"
> datbit
     V170    V171   V172   V173    V174   V175
[1,] "133.8" "12.6" "77.3" "223.7" "65.5" "8.6"
[2,] "129.7" "14.8" "86.3" "230.8" "62.6" "10.2"
[3,] "126.2" "11.1" "74.5" "211.8" "64.8" "8.1"
[4,] "133.7" "14.2" "81.2" "229.1" "64.6" "9.6"
[5,] "141.7" "15.3" "75.4" "232.4" "67.6" "9.8"
[6,] "140.8" "16.8" "87.6" "245.2" "64.3" "10.7"
> plist
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                                177                                178
              Not in Labour Force             Working Age Population
                                179                                180
   Labour Force Participation Rate                  Unemployment Rate
                                181                                182
> matData
     V2      V3     V4      V5       V6     V7
[1,] "855.8" "20.0" "280.0" "1155.8" "75.8" "2.3"
[2,] "863.0" "25.4" "283.5" "1171.9" "75.8" "2.9"
[3,] "850.1" "26.0" "280.7" "1156.8" "75.7" "3.0"
[4,] "839.6" "29.8" "285.9" "1155.3" "75.2" "3.4"
[5,] "854.8" "29.5" "274.7" "1158.9" "76.3" "3.3"
[6,] "845.0" "35.4" "279.4" "1159.8" "75.9" "4.0"
> datbit
     V178   V179   V180   V181    V182   V183
[1,] "79.7" "4.4"  "50.3" "134.4" "62.6" "5.2"
[2,] "74.5" "7.1"  "51.4" "133.0" "61.3" "8.7"
[3,] "77.1" "5.5"  "49.7" "132.3" "62.4" "6.7"
[4,] "84.2" "7.0"  "53.2" "144.5" "63.2" "7.7"
[5,] "85.4" "7.2"  "49.5" "142.1" "65.2" "7.8"
[6,] "77.0" "12.2" "56.3" "145.4" "61.3" "13.6"
> plist
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                                185                                186
              Not in Labour Force             Working Age Population
                                187                                188
   Labour Force Participation Rate                  Unemployment Rate
                                189                                190
> matData
     V2      V3     V4      V5       V6     V7
[1,] "855.8" "20.0" "280.0" "1155.8" "75.8" "2.3"
[2,] "863.0" "25.4" "283.5" "1171.9" "75.8" "2.9"
[3,] "850.1" "26.0" "280.7" "1156.8" "75.7" "3.0"
[4,] "839.6" "29.8" "285.9" "1155.3" "75.2" "3.4"
[5,] "854.8" "29.5" "274.7" "1158.9" "76.3" "3.3"
[6,] "845.0" "35.4" "279.4" "1159.8" "75.9" "4.0"
> datbit
     V186    V187   V188    V189    V190   V191
[1,] "172.1" "9.9"  "96.3"  "278.3" "65.4" "5.4"
[2,] "169.9" "10.5" "107.1" "287.5" "62.8" "5.8"
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[3,] "186.0" "10.1" "113.9" "310.0" "63.2" "5.1"
[4,] "187.7" "9.2"  "109.5" "306.3" "64.3" "4.7"
[5,] "196.3" "13.2" "100.4" "309.9" "67.6" "6.3"
[6,] "193.3" "13.9" "109.3" "316.5" "65.5" "6.7"
> plist
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                               193                                 194
              Not in Labour Force             Working Age Population
                               195                                 196
   Labour Force Participation Rate                  Unemployment Rate
                               197                                 198
> matData
     V2      V3     V4      V5       V6     V7
[1,] "855.8" "20.0" "280.0" "1155.8" "75.8" "2.3"
[2,] "863.0" "25.4" "283.5" "1171.9" "75.8" "2.9"
[3,] "850.1" "26.0" "280.7" "1156.8" "75.7" "3.0"
[4,] "839.6" "29.8" "285.9" "1155.3" "75.2" "3.4"
[5,] "854.8" "29.5" "274.7" "1158.9" "76.3" "3.3"
[6,] "845.0" "35.4" "279.4" "1159.8" "75.9" "4.0"
> datbit
     V194   V195  V196   V197   V198   V199
[1,] "14.1" "1.5" "11.7" "27.3" "57.1" "9.6"
[2,] "14.3" "1.7" "12.4" "28.3" "56.3" "10.4"
[3,] "16.1" "3.0" "12.3" "31.4" "61.0" "15.7"
[4,] "14.9" "1.6" "16.2" "32.8" "50.6" "9.9"
[5,] "12.6" "1.5" "11.1" "25.2" "55.9" "10.7"
[6,] "12.4" "1.7" "12.0" "26.1" "54.2" "12.0"
> plist
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                               201                                 202
              Not in Labour Force             Working Age Population
                               203                                 204
   Labour Force Participation Rate                  Unemployment Rate
                               205                                 206
> matData
     V2      V3     V4      V5       V6     V7
[1,] "855.8" "20.0" "280.0" "1155.8" "75.8" "2.3"
[2,] "863.0" "25.4" "283.5" "1171.9" "75.8" "2.9"
[3,] "850.1" "26.0" "280.7" "1156.8" "75.7" "3.0"
[4,] "839.6" "29.8" "285.9" "1155.3" "75.2" "3.4"
[5,] "854.8" "29.5" "274.7" "1158.9" "76.3" "3.3"
[6,] "845.0" "35.4" "279.4" "1159.8" "75.9" "4.0"
> datbit
     V202   V203  V204   V205   V206   V207
[1,] "11.6" NA    "3.1"  "14.8" "79.2" NA
[2,] "13.4" NA    "6.1"  "20.1" "69.8" NA
[3,] "20.0" "1.6" "9.6"  "31.2" "69.3" "7.2"
[4,] "21.9" NA    "11.0" "33.7" "67.3" NA
[5,] "26.1" "1.1" "11.8" "39.0" "69.8" "4.1"
[6,] "31.2" NA    "13.0" "44.9" "71.0" NA
> plist
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                               209                                 210
              Not in Labour Force             Working Age Population
                               211                                 212
   Labour Force Participation Rate                  Unemployment Rate
                               213                                 214
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> matData
     V2      V3     V4      V5       V6     V7
[1,] "855.8" "20.0" "280.0" "1155.8" "75.8" "2.3"
[2,] "863.0" "25.4" "283.5" "1171.9" "75.8" "2.9"
[3,] "850.1" "26.0" "280.7" "1156.8" "75.7" "3.0"
[4,] "839.6" "29.8" "285.9" "1155.3" "75.2" "3.4"
[5,] "854.8" "29.5" "274.7" "1158.9" "76.3" "3.3"
[6,] "845.0" "35.4" "279.4" "1159.8" "75.9" "4.0"
> datbit
     V210    V211   V212   V213    V214   V215
[1,] "114.3" "7.1"  "42.1" "163.5" "74.3" "5.9"
[2,] "112.2" "8.7"  "46.8" "167.6" "72.1" "7.2"
[3,] "124.0" "8.9"  "53.2" "186.2" "71.4" "6.7"
[4,] "114.4" "8.1"  "49.6" "172.2" "71.2" "6.6"
[5,] "118.2" "8.8"  "42.9" "169.9" "74.8" "7.0"
[6,] "100.7" "13.2" "43.2" "157.1" "72.5" "11.6"
> plist
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                                217                                 218
              Not in Labour Force             Working Age Population
                                219                                 220
   Labour Force Participation Rate                  Unemployment Rate
                                221                                 222
> matData
     V2      V3     V4      V5       V6     V7
[1,] "855.8" "20.0" "280.0" "1155.8" "75.8" "2.3"
[2,] "863.0" "25.4" "283.5" "1171.9" "75.8" "2.9"
[3,] "850.1" "26.0" "280.7" "1156.8" "75.7" "3.0"
[4,] "839.6" "29.8" "285.9" "1155.3" "75.2" "3.4"
[5,] "854.8" "29.5" "274.7" "1158.9" "76.3" "3.3"
[6,] "845.0" "35.4" "279.4" "1159.8" "75.9" "4.0"
> datbit
     V218   V219  V220   V221   V222   V223
[1,] "49.7" "3.0" "20.1" "72.8" "72.3" "5.6"
[2,] "32.6" "2.2" "14.5" "49.3" "70.5" "6.2"
[3,] "34.7" "1.6" "15.9" "52.1" "69.5" "4.3"
[4,] "34.6" "1.7" "13.8" "50.1" "72.4" "4.7"
[5,] "34.0" "2.3" "14.6" "50.9" "71.3" "6.5"
[6,] "34.0" "4.6" "15.9" "54.5" "70.8" "11.8"
> plist
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                                225                                 226
              Not in Labour Force             Working Age Population
                                227                                 228
   Labour Force Participation Rate                  Unemployment Rate
                                229                                 230
> matData
     V2      V3     V4      V5       V6     V7
[1,] "855.8" "20.0" "280.0" "1155.8" "75.8" "2.3"
[2,] "863.0" "25.4" "283.5" "1171.9" "75.8" "2.9"
[3,] "850.1" "26.0" "280.7" "1156.8" "75.7" "3.0"
[4,] "839.6" "29.8" "285.9" "1155.3" "75.2" "3.4"
[5,] "854.8" "29.5" "274.7" "1158.9" "76.3" "3.3"
[6,] "845.0" "35.4" "279.4" "1159.8" "75.9" "4.0"
> datbit
     V226   V227 V228  V229   V230   V231
[1,] "13.1" NA   "5.7" "19.5" "70.5" NA
```

```
[2,] "9.7"  NA   "5.3" "15.6" "66.1" NA
[3,] "5.5"  NA   "6.3" "11.8" "46.3" NA
[4,] "6.3"  NA   NA    "7.2"  "87.5" NA
[5,] "4.0"  NA   "1.2" "5.3"  "78.1" NA
[6,] "3.0"  NA   NA    "4.8"  "79.9" NA
> plist
  Persons Employed in Labour Force Persons Unemployed in Labour Force
                               233                                234
              Not in Labour Force             Working Age Population
                               235                                236
   Labour Force Participation Rate                  Unemployment Rate
                               237                                238
> matData
     V2      V3     V4      V5       V6     V7
[1,] "855.8" "20.0" "280.0" "1155.8" "75.8" "2.3"
[2,] "863.0" "25.4" "283.5" "1171.9" "75.8" "2.9"
[3,] "850.1" "26.0" "280.7" "1156.8" "75.7" "3.0"
[4,] "839.6" "29.8" "285.9" "1155.3" "75.2" "3.4"
[5,] "854.8" "29.5" "274.7" "1158.9" "76.3" "3.3"
[6,] "845.0" "35.4" "279.4" "1159.8" "75.9" "4.0"
> datbit
     V234     V235    V236     V237     V238   V239
[1,] "2207.5" "75.8"  "1028.3" "3311.6" "68.9" "3.3"
[2,] "2156.9" "96.0"  "1069.8" "3322.7" "67.8" "4.3"
[3,] "2184.3" "87.5"  "1058.6" "3330.3" "68.2" "3.9"
[4,] "2183.6" "93.9"  "1060.6" "3338.1" "68.2" "4.1"
[5,] "2227.9" "102.8" "1018.5" "3349.2" "69.6" "4.4"
[6,] "2173.0" "128.8" "1058.9" "3360.8" "68.5" "5.6"
> colplist
$Male
+ European Only (1, 3)
- + Persons Employed in Labour Force (1, 4)
- + Persons Unemployed in Labour Force (2, 4)
- + Not in Labour Force (3, 4)
- + Working Age Population (4, 4)
- + Labour Force Participation Rate (5, 4)
- + Unemployment Rate (6, 4)
- + Employment Rate (7, 4)
- + Total Labour Force (8, 4)
+ Maori Only (9, 3)
- + Persons Employed in Labour Force (9, 4)
- + Persons Unemployed in Labour Force (10, 4)
- + Not in Labour Force (11, 4)
- + Working Age Population (12, 4)
- + Labour Force Participation Rate (13, 4)
- + Unemployment Rate (14, 4)
- + Employment Rate (15, 4)
- + Total Labour Force (16, 4)
+ Pacific Peoples Only (17, 3)
- + Persons Employed in Labour Force (17, 4)
- + Persons Unemployed in Labour Force (18, 4)
- + Not in Labour Force (19, 4)
- + Working Age Population (20, 4)
- + Labour Force Participation Rate (21, 4)
- + Unemployment Rate (22, 4)
- + Employment Rate (23, 4)
- + Total Labour Force (24, 4)
```

```
+ Asian Only (25, 3)
- + Persons Employed in Labour Force (25, 4)
- + Persons Unemployed in Labour Force (26, 4)
- + Not in Labour Force (27, 4)
- + Working Age Population (28, 4)
- + Labour Force Participation Rate (29, 4)
- + Unemployment Rate (30, 4)
- + Employment Rate (31, 4)
- + Total Labour Force (32, 4)
+ MELAA Only (33, 3)
- + Persons Employed in Labour Force (33, 4)
- + Persons Unemployed in Labour Force (34, 4)
- + Not in Labour Force (35, 4)
- + Working Age Population (36, 4)
- + Labour Force Participation Rate (37, 4)
- + Unemployment Rate (38, 4)
- + Employment Rate (39, 4)
- + Total Labour Force (40, 4)
+ Other Ethnicity Only (41, 3)
- + Persons Employed in Labour Force (41, 4)
- + Persons Unemployed in Labour Force (42, 4)
- + Not in Labour Force (43, 4)
- + Working Age Population (44, 4)
- + Labour Force Participation Rate (45, 4)
- + Unemployment Rate (46, 4)
- + Employment Rate (47, 4)
- + Total Labour Force (48, 4)
+ European/Maori (49, 3)
- + Persons Employed in Labour Force (49, 4)
- + Persons Unemployed in Labour Force (50, 4)
- + Not in Labour Force (51, 4)
- + Working Age Population (52, 4)
- + Labour Force Participation Rate (53, 4)
- + Unemployment Rate (54, 4)
- + Employment Rate (55, 4)
- + Total Labour Force (56, 4)
+ Two or More Groups Not Elsewhere Included (57, 3)
- + Persons Employed in Labour Force (57, 4)
- + Persons Unemployed in Labour Force (58, 4)
- + Not in Labour Force (59, 4)
- + Working Age Population (60, 4)
- + Labour Force Participation Rate (61, 4)
- + Unemployment Rate (62, 4)
- + Employment Rate (63, 4)
- + Total Labour Force (64, 4)
+ Residual Categories (65, 3)
- + Persons Employed in Labour Force (65, 4)
- + Persons Unemployed in Labour Force (66, 4)
- + Not in Labour Force (67, 4)
- + Working Age Population (68, 4)
- + Labour Force Participation Rate (69, 4)
- + Unemployment Rate (70, 4)
- + Employment Rate (71, 4)
- + Total Labour Force (72, 4)
+ Total All Ethnic Groups (73, 3)
- + Persons Employed in Labour Force (73, 4)
- + Persons Unemployed in Labour Force (74, 4)
```

```
- + Not in Labour Force (75, 4)
- + Working Age Population (76, 4)
- + Labour Force Participation Rate (77, 4)
- + Unemployment Rate (78, 4)
- + Employment Rate (79, 4)
- + Total Labour Force (80, 4)

$Female
+ European Only (81, 3)
- + Persons Employed in Labour Force (81, 4)
- + Persons Unemployed in Labour Force (82, 4)
- + Not in Labour Force (83, 4)
- + Working Age Population (84, 4)
- + Labour Force Participation Rate (85, 4)
- + Unemployment Rate (86, 4)
- + Employment Rate (87, 4)
- + Total Labour Force (88, 4)
+ Maori Only (89, 3)
- + Persons Employed in Labour Force (89, 4)
- + Persons Unemployed in Labour Force (90, 4)
- + Not in Labour Force (91, 4)
- + Working Age Population (92, 4)
- + Labour Force Participation Rate (93, 4)
- + Unemployment Rate (94, 4)
- + Employment Rate (95, 4)
- + Total Labour Force (96, 4)
+ Pacific Peoples Only (97, 3)
- + Persons Employed in Labour Force (97, 4)
- + Persons Unemployed in Labour Force (98, 4)
- + Not in Labour Force (99, 4)
- + Working Age Population (100, 4)
- + Labour Force Participation Rate (101, 4)
- + Unemployment Rate (102, 4)
- + Employment Rate (103, 4)
- + Total Labour Force (104, 4)
+ Asian Only (105, 3)
- + Persons Employed in Labour Force (105, 4)
- + Persons Unemployed in Labour Force (106, 4)
- + Not in Labour Force (107, 4)
- + Working Age Population (108, 4)
- + Labour Force Participation Rate (109, 4)
- + Unemployment Rate (110, 4)
- + Employment Rate (111, 4)
- + Total Labour Force (112, 4)
+ MELAA Only (113, 3)
- + Persons Employed in Labour Force (113, 4)
- + Persons Unemployed in Labour Force (114, 4)
- + Not in Labour Force (115, 4)
- + Working Age Population (116, 4)
- + Labour Force Participation Rate (117, 4)
- + Unemployment Rate (118, 4)
- + Employment Rate (119, 4)
- + Total Labour Force (120, 4)
+ Other Ethnicity Only (121, 3)
- + Persons Employed in Labour Force (121, 4)
- + Persons Unemployed in Labour Force (122, 4)
- + Not in Labour Force (123, 4)
```

```
- + Working Age Population (124, 4)
- + Labour Force Participation Rate (125, 4)
- + Unemployment Rate (126, 4)
- + Employment Rate (127, 4)
- + Total Labour Force (128, 4)
+ European/Maori (129, 3)
- + Persons Employed in Labour Force (129, 4)
- + Persons Unemployed in Labour Force (130, 4)
- + Not in Labour Force (131, 4)
- + Working Age Population (132, 4)
- + Labour Force Participation Rate (133, 4)
- + Unemployment Rate (134, 4)
- + Employment Rate (135, 4)
- + Total Labour Force (136, 4)
+ Two or More Groups Not Elsewhere Included (137, 3)
- + Persons Employed in Labour Force (137, 4)
- + Persons Unemployed in Labour Force (138, 4)
- + Not in Labour Force (139, 4)
- + Working Age Population (140, 4)
- + Labour Force Participation Rate (141, 4)
- + Unemployment Rate (142, 4)
- + Employment Rate (143, 4)
- + Total Labour Force (144, 4)
+ Residual Categories (145, 3)
- + Persons Employed in Labour Force (145, 4)
- + Persons Unemployed in Labour Force (146, 4)
- + Not in Labour Force (147, 4)
- + Working Age Population (148, 4)
- + Labour Force Participation Rate (149, 4)
- + Unemployment Rate (150, 4)
- + Employment Rate (151, 4)
- + Total Labour Force (152, 4)
+ Total All Ethnic Groups (153, 3)
- + Persons Employed in Labour Force (153, 4)
- + Persons Unemployed in Labour Force (154, 4)
- + Not in Labour Force (155, 4)
- + Working Age Population (156, 4)
- + Labour Force Participation Rate (157, 4)
- + Unemployment Rate (158, 4)
- + Employment Rate (159, 4)
- + Total Labour Force (160, 4)

$‘Total Both Sexes‘
+ European Only (161, 3)
- + Persons Employed in Labour Force (161, 4)
- + Persons Unemployed in Labour Force (162, 4)
- + Not in Labour Force (163, 4)
- + Working Age Population (164, 4)
- + Labour Force Participation Rate (165, 4)
- + Unemployment Rate (166, 4)
- + Employment Rate (167, 4)
- + Total Labour Force (168, 4)
+ Maori Only (169, 3)
- + Persons Employed in Labour Force (169, 4)
- + Persons Unemployed in Labour Force (170, 4)
- + Not in Labour Force (171, 4)
- + Working Age Population (172, 4)
```

- + Labour Force Participation Rate (173, 4)
- + Unemployment Rate (174, 4)
- + Employment Rate (175, 4)
- + Total Labour Force (176, 4)
+ Pacific Peoples Only (177, 3)
- + Persons Employed in Labour Force (177, 4)
- + Persons Unemployed in Labour Force (178, 4)
- + Not in Labour Force (179, 4)
- + Working Age Population (180, 4)
- + Labour Force Participation Rate (181, 4)
- + Unemployment Rate (182, 4)
- + Employment Rate (183, 4)
- + Total Labour Force (184, 4)
+ Asian Only (185, 3)
- + Persons Employed in Labour Force (185, 4)
- + Persons Unemployed in Labour Force (186, 4)
- + Not in Labour Force (187, 4)
- + Working Age Population (188, 4)
- + Labour Force Participation Rate (189, 4)
- + Unemployment Rate (190, 4)
- + Employment Rate (191, 4)
- + Total Labour Force (192, 4)
+ MELAA Only (193, 3)
- + Persons Employed in Labour Force (193, 4)
- + Persons Unemployed in Labour Force (194, 4)
- + Not in Labour Force (195, 4)
- + Working Age Population (196, 4)
- + Labour Force Participation Rate (197, 4)
- + Unemployment Rate (198, 4)
- + Employment Rate (199, 4)
- + Total Labour Force (200, 4)
+ Other Ethnicity Only (201, 3)
- + Persons Employed in Labour Force (201, 4)
- + Persons Unemployed in Labour Force (202, 4)
- + Not in Labour Force (203, 4)
- + Working Age Population (204, 4)
- + Labour Force Participation Rate (205, 4)
- + Unemployment Rate (206, 4)
- + Employment Rate (207, 4)
- + Total Labour Force (208, 4)
+ European/Maori (209, 3)
- + Persons Employed in Labour Force (209, 4)
- + Persons Unemployed in Labour Force (210, 4)
- + Not in Labour Force (211, 4)
- + Working Age Population (212, 4)
- + Labour Force Participation Rate (213, 4)
- + Unemployment Rate (214, 4)
- + Employment Rate (215, 4)
- + Total Labour Force (216, 4)
+ Two or More Groups Not Elsewhere Included (217, 3)
- + Persons Employed in Labour Force (217, 4)
- + Persons Unemployed in Labour Force (218, 4)
- + Not in Labour Force (219, 4)
- + Working Age Population (220, 4)
- + Labour Force Participation Rate (221, 4)
- + Unemployment Rate (222, 4)
- + Employment Rate (223, 4)

```
- + Total Labour Force (224, 4)
+ Residual Categories (225, 3)
- + Persons Employed in Labour Force (225, 4)
- + Persons Unemployed in Labour Force (226, 4)
- + Not in Labour Force (227, 4)
- + Working Age Population (228, 4)
- + Labour Force Participation Rate (229, 4)
- + Unemployment Rate (230, 4)
- + Employment Rate (231, 4)
- + Total Labour Force (232, 4)
+ Total All Ethnic Groups (233, 3)
- + Persons Employed in Labour Force (233, 4)
- + Persons Unemployed in Labour Force (234, 4)
- + Not in Labour Force (235, 4)
- + Working Age Population (236, 4)
- + Labour Force Participation Rate (237, 4)
- + Unemployment Rate (238, 4)
- + Employment Rate (239, 4)
- + Total Labour Force (240, 4)

> res
  UNKNOWN       UNKNOWN UNKNOWN Persons Employed in Labour Force
1    Male European Only  2007Q4                            855.8
2    Male European Only  2008Q1                            863.0
3    Male European Only  2008Q2                            850.1
4    Male European Only  2008Q3                            839.6
5    Male European Only  2008Q4                            854.8
6    Male European Only  2009Q1                            845.0
  Persons Unemployed in Labour Force Not in Labour Force Working Age Population
1                               20.0                280.0                 1155.8
2                               25.4                283.5                 1171.9
3                               26.0                280.7                 1156.8
4                               29.8                285.9                 1155.3
5                               29.5                274.7                 1158.9
6                               35.4                279.4                 1159.8
  Labour Force Participation Rate Unemployment Rate Employment Rate
1                            75.8                2.3             74.0
2                            75.8                2.9             73.6
3                            75.7                3.0             73.5
4                            75.2                3.4             72.7
5                            76.3                3.3             73.8
6                            75.9                4.0             72.9
  Total Labour Force
1              875.8
2              888.5
3              876.1
4              869.4
5              884.2
6              880.4
```

8.7 ToyExByEmptyBelow.csv

	1	2	3	4	5	6
1			Column 1	Column 2	Column 3	Column 4
2	Row Parent1	Row Child1	10	20	30	40
3		Row Child2	11	21	31	41
4	Row Parent2	Row Child1	12	22	32	42
5		Row Child2	13	23	33	43

```
> rowData
[1] 2 5
> colData
[1] 3 6
> rowslist
$label
[1] 1

$data
[1] 2 3 4 5

> colslist
$label
[1] 1 2

$data
[1] 3 4 5 6

> res
$‘Row Parent1‘
$‘Row Parent1‘$rows
[1] 1 2

$‘Row Parent1‘$cols
[1] 2


$‘Row Parent2‘
$‘Row Parent2‘$rows
[1] 3 4

$‘Row Parent2‘$cols
[1] 2


> plist
$rows
[1] 1 2

$cols
[1] 2

> res
Row Child1 Row Child2
         1          2
> plist
$rows
```

```
[1] 3 4

$cols
[1] 2

> res
Row Child1 Row Child2
         3          4
> rowplist
$`Row Parent1`
+ Row Child1 (1, 2)
+ Row Child2 (2, 2)

$`Row Parent2`
+ Row Child1 (3, 2)
+ Row Child2 (4, 2)

> rowvecs
     [,1]           [,2]
[1,] "Row Parent1" "Row Child1"
[2,] "Row Parent1" "Row Child2"
[3,] "Row Parent2" "Row Child1"
[4,] "Row Parent2" "Row Child2"
> matColLabel
     V3         V4         V5         V6
[1,] "Column 1" "Column 2" "Column 3" "Column 4"
> cursub
        V3         V4         V5         V6
"Column 1" "Column 2" "Column 3" "Column 4"
> currow[curcols]
        V3         V4         V5         V6
"Column 1" "Column 2" "Column 3" "Column 4"
> matColLabel
     V3         V4         V5         V6
[1,] "Column 1" "Column 2" "Column 3" "Column 4"
> matColLabel
     V3         V4         V5         V6
[1,] "Column 1" "Column 2" "Column 3" "Column 4"
> matColLabel
     V3         V4         V5         V6
[1,] "Column 1" "Column 2" "Column 3" "Column 4"
> plist
$rows
[1] 1 2 3 4

$cols
[1] 1

> res
Column 1 Column 2 Column 3 Column 4
       1        2        3        4
> plist
Column 1 Column 2 Column 3 Column 4
       1        2        3        4
> matData
     V3   V4   V5   V6
[1,] "10" "20" "30" "40"
```

```
[2,] "11" "21" "31" "41"
[3,] "12" "22" "32" "42"
[4,] "13" "23" "33" "43"
> datbit
     V3   V4   V5   V6
[1,] "10" "20" "30" "40"
[2,] "11" "21" "31" "41"
[3,] "12" "22" "32" "42"
[4,] "13" "23" "33" "43"
> colplist
Column 1 Column 2 Column 3 Column 4
       1        2        3        4
> res
      UNKNOWN    UNKNOWN Column 1 Column 2 Column 3 Column 4
1 Row Parent1 Row Child1       10       20       30       40
2 Row Parent1 Row Child2       11       21       31       41
3 Row Parent2 Row Child1       12       22       32       42
4 Row Parent2 Row Child2       13       23       33       43
```

8.8 ToyExByEmptyBelowT.csv

	1	2	3	4	5	6
1		Row Parent1		Row Parent2		
2		Row Child1	Row Child2	Row Child1	Row Child2	
3	Column 1	10	11	12	13	
4	Column 2	20	21	22	23	
5	Column 3	30	31	32	33	
6	Column 4	40	41	42	43	

```
> rowData
[1] 3 6
> colData
[1] 2 5
> rowslist
$label
[1] 1 2

$data
[1] 3 4 5 6

> colslist
$label
[1] 1

$data
[1] 2 3 4 5

> plist
$rows
[1] 1 2 3 4

$cols
[1] 1

> res
Column 1 Column 2 Column 3 Column 4
       1        2        3        4
> rowplist
Column 1 Column 2 Column 3 Column 4
       1        2        3        4
> rowvecs
     [,1]
[1,] "Column 1"
[2,] "Column 2"
[3,] "Column 3"
[4,] "Column 4"
> matColLabel
     V2            V3           V4            V5
[1,] "Row Parent1" NA           "Row Parent2" NA
[2,] "Row Child1"  "Row Child2" "Row Child1"  "Row Child2"
> cursub
           V2            V3
"Row Parent1"            NA
> currow[curcols]
           V2            V3
```

```
"Row Parent1"            NA
> cursub
          V4            V5
"Row Parent2"            NA
> currow[curcols]
          V4            V5
"Row Parent2"            NA
> cursub
         V2           V3
"Row Child1" "Row Child2"
> currow[curcols]
         V2           V3
"Row Child1" "Row Child2"
> cursub
         V4           V5
"Row Child1" "Row Child2"
> currow[curcols]
         V4           V5
"Row Child1" "Row Child2"
> matColLabel
     V2            V3           V4            V5
[1,] "Row Parent1" NA           "Row Parent2" NA
[2,] "Row Child1"  "Row Child2" "Row Child1"  "Row Child2"
> matColLabel
     V2            V3           V4            V5
[1,] "Row Parent1" NA           "Row Parent2" NA
[2,] "Row Child1"  "Row Child2" "Row Child1"  "Row Child2"
> matColLabel
     V2            V3           V4            V5
[1,] "Row Parent1" NA           "Row Parent2" NA
[2,] "Row Child1"  "Row Child2" "Row Child1"  "Row Child2"
> res
$`Row Parent1`
$`Row Parent1`$rows
[1] 1 2

$`Row Parent1`$cols
[1] 2


$`Row Parent2`
$`Row Parent2`$rows
[1] 3 4

$`Row Parent2`$cols
[1] 2


> plist
$rows
[1] 1 2

$cols
[1] 2

> res
Row Child1 Row Child2
```

```
         1          2
> plist
$rows
[1] 3 4

$cols
[1] 2

> res
Row Child1 Row Child2
         3          4
> plist
Row Child1 Row Child2
         1          2
> matData
     V2   V3   V4   V5
[1,] "10" "11" "12" "13"
[2,] "20" "21" "22" "23"
[3,] "30" "31" "32" "33"
[4,] "40" "41" "42" "43"
> datbit
     V2   V3
[1,] "10" "11"
[2,] "20" "21"
[3,] "30" "31"
[4,] "40" "41"
> plist
Row Child1 Row Child2
         3          4
> matData
     V2   V3   V4   V5
[1,] "10" "11" "12" "13"
[2,] "20" "21" "22" "23"
[3,] "30" "31" "32" "33"
[4,] "40" "41" "42" "43"
> datbit
     V4   V5
[1,] "12" "13"
[2,] "22" "23"
[3,] "32" "33"
[4,] "42" "43"
> colplist
$`Row Parent1`
+ Row Child1 (1, 2)
+ Row Child2 (2, 2)

$`Row Parent2`
+ Row Child1 (3, 2)
+ Row Child2 (4, 2)

> res
      UNKNOWN  UNKNOWN Row Child1 Row Child2
1 Row Parent1 Column 1         10         11
2 Row Parent1 Column 2         20         21
3 Row Parent1 Column 3         30         31
4 Row Parent1 Column 4         40         41
5 Row Parent2 Column 1         12         13
```

```
6 Row Parent2 Column 2          22          23
```

8.9 ToyExByEmptyRight1.csv

	1	2	3	4	5	6	7
1				Column 1	Column 2	Column 3	Column 4
2	Row Parent1			10	20	30	40
3	Row Child1	Row Child−Child1		11	21	31	41
4	Row Child2	Row Child−Child2		12	22	32	42
5	Row Parent2			13	23	33	43
6	Row Child1	Row Child−Child1		14	24	34	44
7		Row Child−Child2		15	25	35	45

```
> rowData
[1] 2 7
> colData
[1] 4 7
> rowslist
$label
[1] 1

$data
[1] 2 3 4 5 6 7

> colslist
$label
[1] 1 2

$data
[1] 4 5 6 7

> res
$‘Row Parent1‘
$‘Row Parent1‘$rows
[1] 2 3

$‘Row Parent1‘$cols
[1] 1 2


$‘Row Parent2‘
$‘Row Parent2‘$rows
[1] 5 6

$‘Row Parent2‘$cols
[1] 1 2


> res
$‘Row Child1‘
$‘Row Child1‘$rows
[1] 2

$‘Row Child1‘$cols
[1] 2


$‘Row Child2‘
$‘Row Child2‘$rows
```

```
[1] 3

$`Row Child2`$cols
[1] 2


> plist
$rows
[1] 2

$cols
[1] 2

> res
Row Child-Child1
               2
> plist
$rows
[1] 3

$cols
[1] 2

> res
Row Child-Child2
               3
> res
$`Row Child1`
$`Row Child1`$rows
[1] 5 6

$`Row Child1`$cols
[1] 2


> plist
$rows
[1] 5 6

$cols
[1] 2

> res
Row Child-Child1 Row Child-Child2
               5                6
> rowplist
$`Row Parent1`
+ Row Child1 (2, 1)
- + Row Child-Child1 (2, 2)
+ Row Child2 (3, 1)
- + Row Child-Child2 (3, 2)

$`Row Parent2`
+ Row Child1 (5, 1)
- + Row Child-Child1 (5, 2)
- + Row Child-Child2 (6, 2)
```

```
> rowvecs
   [,1]          [,2]         [,3]
V2 "Row Parent1" "Row Child1" "Row Child-Child1"
V2 "Row Parent1" "Row Child2" "Row Child-Child2"
   "Row Parent2" "Row Child1" "Row Child-Child1"
   "Row Parent2" "Row Child1" "Row Child-Child2"
> matColLabel
     V4         V5         V6         V7
[1,] "Column 1" "Column 2" "Column 3" "Column 4"
> cursub
        V4         V5         V6         V7
"Column 1" "Column 2" "Column 3" "Column 4"
> currow[curcols]
        V4         V5         V6         V7
"Column 1" "Column 2" "Column 3" "Column 4"
> matColLabel
     V4         V5         V6         V7
[1,] "Column 1" "Column 2" "Column 3" "Column 4"
> matColLabel
     V4         V5         V6         V7
[1,] "Column 1" "Column 2" "Column 3" "Column 4"
> matColLabel
     V4         V5         V6         V7
[1,] "Column 1" "Column 2" "Column 3" "Column 4"
> plist
$rows
[1] 1 2 3 4

$cols
[1] 1

> res
Column 1 Column 2 Column 3 Column 4
       1        2        3        4
> plist
Column 1 Column 2 Column 3 Column 4
       1        2        3        4
> matData
     V4   V5   V6   V7
[1,] "11" "21" "31" "41"
[2,] "12" "22" "32" "42"
[3,] "14" "24" "34" "44"
[4,] "15" "25" "35" "45"
> datbit
     V4   V5   V6   V7
[1,] "11" "21" "31" "41"
[2,] "12" "22" "32" "42"
[3,] "14" "24" "34" "44"
[4,] "15" "25" "35" "45"
> colplist
Column 1 Column 2 Column 3 Column 4
       1        2        3        4
> res
      UNKNOWN    UNKNOWN          UNKNOWN Column 1 Column 2 Column 3 Column 4
1 Row Parent1 Row Child1 Row Child-Child1       11       21       31       41
2 Row Parent1 Row Child2 Row Child-Child2       12       22       32       42
3 Row Parent2 Row Child1 Row Child-Child1       14       24       34       44
```

```
4 Row Parent2 Row Child1 Row Child-Child2       15       25       35       45
```

8.10 ToyExByEmptyRight2.csv

	1	2	3	4	5	6
1			Column 1	Column 2	Column 3	Column 4
2	Row Parent1		10	20	30	40
3		Row Child1	11	21	31	41
4		Row Child2	12	22	32	42
5	Row Parent2		13	23	33	43
6		Row Child1	14	24	34	44
7		Row Child2	15	25	35	45

```
> rowData
[1] 2 7
> colData
[1] 3 6
> rowslist
$label
[1] 1

$data
[1] 2 3 4 5 6 7

> colslist
$label
[1] 1 2

$data
[1] 3 4 5 6

> res
$‘Row Parent1‘
$‘Row Parent1‘$rows
[1] 2 3

$‘Row Parent1‘$cols
[1] 1 2


$‘Row Parent2‘
$‘Row Parent2‘$rows
[1] 5 6

$‘Row Parent2‘$cols
[1] 1 2


> plist
$rows
[1] 2 3

$cols
[1] 2

> res
Row Child1 Row Child2
         2          3
```

```
> plist
$rows
[1] 5 6

$cols
[1] 2

> res
Row Child1 Row Child2
         5          6
> rowplist
$`Row Parent1`
+ Row Child1 (2, 2)
+ Row Child2 (3, 2)

$`Row Parent2`
+ Row Child1 (5, 2)
+ Row Child2 (6, 2)

> rowvecs
     [,1]          [,2]
[1,] "Row Parent1" "Row Child1"
[2,] "Row Parent1" "Row Child2"
[3,] "Row Parent2" "Row Child1"
[4,] "Row Parent2" "Row Child2"
> matColLabel
     V3         V4         V5         V6
[1,] "Column 1" "Column 2" "Column 3" "Column 4"
> cursub
        V3         V4         V5         V6
"Column 1" "Column 2" "Column 3" "Column 4"
> currow[curcols]
        V3         V4         V5         V6
"Column 1" "Column 2" "Column 3" "Column 4"
> matColLabel
     V3         V4         V5         V6
[1,] "Column 1" "Column 2" "Column 3" "Column 4"
> matColLabel
     V3         V4         V5         V6
[1,] "Column 1" "Column 2" "Column 3" "Column 4"
> matColLabel
     V3         V4         V5         V6
[1,] "Column 1" "Column 2" "Column 3" "Column 4"
> plist
$rows
[1] 1 2 3 4

$cols
[1] 1

> res
Column 1 Column 2 Column 3 Column 4
       1        2        3        4
> plist
Column 1 Column 2 Column 3 Column 4
       1        2        3        4
> matData
```

```
     V3   V4   V5   V6
[1,] "11" "21" "31" "41"
[2,] "12" "22" "32" "42"
[3,] "14" "24" "34" "44"
[4,] "15" "25" "35" "45"
> datbit
     V3   V4   V5   V6
[1,] "11" "21" "31" "41"
[2,] "12" "22" "32" "42"
[3,] "14" "24" "34" "44"
[4,] "15" "25" "35" "45"
> colplist
Column 1 Column 2 Column 3 Column 4
       1        2        3        4
> res
      UNKNOWN    UNKNOWN Column 1 Column 2 Column 3 Column 4
1 Row Parent1 Row Child1       11       21       31       41
2 Row Parent1 Row Child2       12       22       32       42
3 Row Parent2 Row Child1       14       24       34       44
4 Row Parent2 Row Child2       15       25       35       45
```

8.11 ToyExByEmptyRight3.csv

	1	2	3	4	5	6	7	8
1				Column 1	Column 2	Column 3	Column 4	
2	Row Super−Parent1			10	20	30	40	
3	Row Parent1			11	21	31	41	
4	Row Child1	Row Child−Child1		12	22	32	42	
5	Row Parent2			13	23	33	43	
6	Row Child1	Row Child−Child1		14	24	34	44	
7	Row Super−Parent2			15	25	35	45	
8	Row Parent1			16	26	36	46	
9	Row Child1	Row Child−Child1		17	27	37	47	
10	Row Parent2			18	28	38	48	
11	Row Child1	Row Child−Child1		19	29	39	49	

```
> rowData
[1]  2 11
> colData
[1] 4 7
> rowslist
$label
[1] 1

$data
 [1]  2  3  4  5  6  7  8  9 10 11

> colslist
$label
[1] 1 2

$data
[1] 4 5 6 7

> res
$`Row Super-Parent1`
$`Row Super-Parent1`$rows
[1] 2 3 4 5

$`Row Super-Parent1`$cols
[1] 1 2


$`Row Super-Parent2`
$`Row Super-Parent2`$rows
[1]  7  8  9 10

$`Row Super-Parent2`$cols
[1] 1 2


> res
$`Row Parent1`
$`Row Parent1`$rows
[1] 3

$`Row Parent1`$cols
[1] 1 2
```

```
$`Row Parent2`
$`Row Parent2`$rows
[1] 5

$`Row Parent2`$cols
[1] 1 2


> plist
$rows
[1] 3

$cols
[1] 1 2

> res
$`Row Child1`
+ Row Child-Child1 (3, 2)

> plist
$rows
[1] 5

$cols
[1] 1 2

> res
$`Row Child1`
+ Row Child-Child1 (5, 2)

> res
$`Row Parent1`
$`Row Parent1`$rows
[1] 8

$`Row Parent1`$cols
[1] 1 2


$`Row Parent2`
$`Row Parent2`$rows
[1] 10

$`Row Parent2`$cols
[1] 1 2


> plist
$rows
[1] 8

$cols
[1] 1 2

> res
$`Row Child1`
```

```
+ Row Child-Child1 (8, 2)

> plist
$rows
[1] 10

$cols
[1] 1 2

> res
$`Row Child1`
+ Row Child-Child1 (10, 2)

> rowplist
$`Row Super-Parent1`
+ Row Parent1 (2, 1)
- + Row Child1 (3, 1)
- - + Row Child-Child1 (3, 2)
+ Row Parent2 (4, 1)
- + Row Child1 (5, 1)
- - + Row Child-Child1 (5, 2)

$`Row Super-Parent2`
+ Row Parent1 (7, 1)
- + Row Child1 (8, 1)
- - + Row Child-Child1 (8, 2)
+ Row Parent2 (9, 1)
- + Row Child1 (10, 1)
- - + Row Child-Child1 (10, 2)

> rowvecs
   [,1]                [,2]           [,3]          [,4]
V2 "Row Super-Parent1" "Row Parent1" "Row Child1" "Row Child-Child1"
V2 "Row Super-Parent1" "Row Parent2" "Row Child1" "Row Child-Child1"
V2 "Row Super-Parent2" "Row Parent1" "Row Child1" "Row Child-Child1"
V2 "Row Super-Parent2" "Row Parent2" "Row Child1" "Row Child-Child1"
> matColLabel
     V4         V5         V6         V7
[1,] "Column 1" "Column 2" "Column 3" "Column 4"
> cursub
        V4         V5         V6         V7
"Column 1" "Column 2" "Column 3" "Column 4"
> currow[curcols]
        V4         V5         V6         V7
"Column 1" "Column 2" "Column 3" "Column 4"
> matColLabel
     V4         V5         V6         V7
[1,] "Column 1" "Column 2" "Column 3" "Column 4"
> matColLabel
     V4         V5         V6         V7
[1,] "Column 1" "Column 2" "Column 3" "Column 4"
> matColLabel
     V4         V5         V6         V7
[1,] "Column 1" "Column 2" "Column 3" "Column 4"
> plist
$rows
[1] 1 2 3 4
```

```
$cols
[1] 1

> res
Column 1 Column 2 Column 3 Column 4
       1        2        3        4
> plist
Column 1 Column 2 Column 3 Column 4
       1        2        3        4
> matData
     V4   V5   V6   V7
[1,] "12" "22" "32" "42"
[2,] "14" "24" "34" "44"
[3,] "17" "27" "37" "47"
[4,] "19" "29" "39" "49"
> datbit
     V4   V5   V6   V7
[1,] "12" "22" "32" "42"
[2,] "14" "24" "34" "44"
[3,] "17" "27" "37" "47"
[4,] "19" "29" "39" "49"
> colplist
Column 1 Column 2 Column 3 Column 4
       1        2        3        4
> res
            UNKNOWN     UNKNOWN    UNKNOWN          UNKNOWN Column 1 Column 2
1 Row Super-Parent1 Row Parent1 Row Child1 Row Child-Child1       12       22
2 Row Super-Parent1 Row Parent2 Row Child1 Row Child-Child1       14       24
3 Row Super-Parent2 Row Parent1 Row Child1 Row Child-Child1       17       27
4 Row Super-Parent2 Row Parent2 Row Child1 Row Child-Child1       19       29
  Column 3 Column 4
1       32       42
2       34       44
3       37       47
4       39       49
```

8.12 ToyExComplete.csv

	1	2	3	4	5	6	7	8	9	10	11
1	MISC INFORMATION										
2					Col Parent1				Col Parent2		
3				Col	Col	Col	Col	Col	Col	Col	Col
4				Child1	Child2	Child3	Child4	Child1	Child2	Child3	Child4
5	Row Super−Parent			10	20	30	40	50	60	70	80
6	Row Parent1			11	21	31	41	51	61	71	81
7	Row Child1	Row Child−Child1		12	22	32	42	52	62	72	82
8		Row Child−Child2		13	23	33	43	53	63	73	83
9	Row Child2	Row Child−Child1		14	24	34	44	54	64	74	84
10		Row Child−Child2		15	25	35	45	55	65	75	85
11	Row Parent2			16	26	36	46	56	66	76	86
12	Row Child1	Row Child−Child1		17	27	37	47	57	67	77	87
13		Row Child−Child2		18	28	38	48	58	68	78	88
14	Row Child2	Row Child−Child2		19	29	39	49	59	69	79	89
15	MISC INFORMATION										
16	MISC INFORMATION										

```
> rowData
[1]  5 14
> colData
[1]  4 11
> rowslist
$label
[1] 1 2 3 4

$data
 [1]  5  6  7  8  9 10 11 12 13 14

> colslist
$label
[1] 1 2

$data
[1]  4  5  6  7  8  9 10 11

> res
$`Row Super-Parent`
$`Row Super-Parent`$rows
[1]  2  3  4  5  6  7  8  9 10

$`Row Super-Parent`$cols
[1] 1 2


> res
$`Row Parent1`
$`Row Parent1`$rows
[1] 3 4 5 6

$`Row Parent1`$cols
[1] 1 2


$`Row Parent2`
$`Row Parent2`$rows
[1]  8  9 10

$`Row Parent2`$cols
[1] 1 2
```

```
> res
$`Row Child1`
$`Row Child1`$rows
[1] 3 4

$`Row Child1`$cols
[1] 2


$`Row Child2`
$`Row Child2`$rows
[1] 5 6

$`Row Child2`$cols
[1] 2


> plist
$rows
[1] 3 4

$cols
[1] 2

> res
Row Child-Child1 Row Child-Child2
               3                4
> plist
$rows
[1] 5 6

$cols
[1] 2

> res
Row Child-Child1 Row Child-Child2
               5                6
> res
$`Row Child1`
$`Row Child1`$rows
[1] 8 9

$`Row Child1`$cols
[1] 2


$`Row Child2`
$`Row Child2`$rows
[1] 10

$`Row Child2`$cols
[1] 2


> plist
$rows
```

```
[1] 8 9

$cols
[1] 2

> res
Row Child-Child1 Row Child-Child2
               8                9
> plist
$rows
[1] 10

$cols
[1] 2

> res
Row Child-Child2
              10
> rowplist
$`Row Super-Parent`
+ Row Parent1 (2, 1)
- + Row Child1 (3, 1)
- - + Row Child-Child1 (3, 2)
- - + Row Child-Child2 (4, 2)
- + Row Child2 (5, 1)
- - + Row Child-Child1 (5, 2)
- - + Row Child-Child2 (6, 2)
+ Row Parent2 (7, 1)
- + Row Child1 (8, 1)
- - + Row Child-Child1 (8, 2)
- - + Row Child-Child2 (9, 2)
- + Row Child2 (10, 1)
- - + Row Child-Child2 (10, 2)

> rowvecs
 [,1]                [,2]           [,3]          [,4]
 "Row Super-Parent" "Row Parent1" "Row Child1" "Row Child-Child1"
 "Row Super-Parent" "Row Parent1" "Row Child1" "Row Child-Child2"
 "Row Super-Parent" "Row Parent1" "Row Child2" "Row Child-Child1"
 "Row Super-Parent" "Row Parent1" "Row Child2" "Row Child-Child2"
 "Row Super-Parent" "Row Parent2" "Row Child1" "Row Child-Child1"
 "Row Super-Parent" "Row Parent2" "Row Child1" "Row Child-Child2"
> matColLabel
     V4       V5             V6       V7       V8       V9
[1,] NA       NA             NA       NA       NA       NA
[2,] NA       "Col Parent1" NA       NA       NA       "Col Parent2"
[3,] "Col"    "Col"          "Col"    "Col"    "Col"    "Col"
[4,] "Child1" "Child2"       "Child3" "Child4" "Child1" "Child2"
> cursub
           V4             V5             V6             V7
           NA "Col Parent1"              NA             NA
> currow[curcols]
           V4             V5             V6             V7
"Col Parent1"             NA             NA             NA
> cursub
           V8             V9            V10            V11
           NA "Col Parent2"              NA             NA
```

```
> currow[curcols]
          V8            V9           V10           V11
"Col Parent2"            NA            NA            NA
> cursub
   V4
"Col"
> currow[curcols]
   V4
"Col"
> cursub
   V5
"Col"
> currow[curcols]
   V5
"Col"
> cursub
   V6
"Col"
> currow[curcols]
   V6
"Col"
> cursub
   V7
"Col"
> currow[curcols]
   V7
"Col"
> cursub
   V8
"Col"
> currow[curcols]
   V8
"Col"
> cursub
   V9
"Col"
> currow[curcols]
   V9
"Col"
> cursub
  V10
"Col"
> currow[curcols]
  V10
"Col"
> cursub
  V11
"Col"
> currow[curcols]
  V11
"Col"
> cursub
      V4       V5       V6       V7
"Child1" "Child2" "Child3" "Child4"
> currow[curcols]
      V4       V5       V6       V7
"Child1" "Child2" "Child3" "Child4"
```

```
> cursub
      V8       V9      V10      V11
"Child1" "Child2" "Child3" "Child4"
> currow[curcols]
      V8       V9      V10      V11
"Child1" "Child2" "Child3" "Child4"
> matColLabel
     V4             V5       V6       V7       V8             V9
[1,] NA             NA       NA       NA       NA             NA
[2,] "Col Parent1" NA       NA       NA       "Col Parent2" NA
[3,] "Col"         "Col"    "Col"    "Col"    "Col"         "Col"
[4,] "Child1"      "Child2" "Child3" "Child4" "Child1"      "Child2"
> matColLabel
     V4             V5       V6       V7       V8             V9
[1,] NA             NA       NA       NA       NA             NA
[2,] "Col Parent1" NA       NA       NA       "Col Parent2" NA
[3,] "Col"         "Col"    "Col"    "Col"    "Col"         "Col"
[4,] "Child1"      "Child2" "Child3" "Child4" "Child1"      "Child2"
> matColLabel
     V4             V5           V6           V7           V8
[1,] NA             NA           NA           NA           NA
[2,] "Col Parent1" NA           NA           NA           "Col Parent2"
[3,] "Col Child1"  "Col Child2" "Col Child3" "Col Child4" "Col Child1"
     V9
[1,] NA
[2,] NA
[3,] "Col Child2"
> res
$`Col Parent1`
$`Col Parent1`$rows
[1] 1 2 3 4

$`Col Parent1`$cols
[1] 3


$`Col Parent2`
$`Col Parent2`$rows
[1] 5 6 7 8

$`Col Parent2`$cols
[1] 3


> plist
$rows
[1] 1 2 3 4

$cols
[1] 3

> res
Col Child1 Col Child2 Col Child3 Col Child4
         1          2          3          4
> plist
$rows
[1] 5 6 7 8
```

```
$cols
[1] 3

> res
Col Child1 Col Child2 Col Child3 Col Child4
         5          6          7          8
> plist
Col Child1 Col Child2 Col Child3 Col Child4
         1          2          3          4
> matData
     V4   V5   V6   V7   V8   V9
[1,] "12" "22" "32" "42" "52" "62"
[2,] "13" "23" "33" "43" "53" "63"
[3,] "14" "24" "34" "44" "54" "64"
[4,] "15" "25" "35" "45" "55" "65"
[5,] "17" "27" "37" "47" "57" "67"
[6,] "18" "28" "38" "48" "58" "68"
> datbit
     V4   V5   V6   V7
[1,] "12" "22" "32" "42"
[2,] "13" "23" "33" "43"
[3,] "14" "24" "34" "44"
[4,] "15" "25" "35" "45"
[5,] "17" "27" "37" "47"
[6,] "18" "28" "38" "48"
> plist
Col Child1 Col Child2 Col Child3 Col Child4
         5          6          7          8
> matData
     V4   V5   V6   V7   V8   V9
[1,] "12" "22" "32" "42" "52" "62"
[2,] "13" "23" "33" "43" "53" "63"
[3,] "14" "24" "34" "44" "54" "64"
[4,] "15" "25" "35" "45" "55" "65"
[5,] "17" "27" "37" "47" "57" "67"
[6,] "18" "28" "38" "48" "58" "68"
> datbit
     V8   V9   V10  V11
[1,] "52" "62" "72" "82"
[2,] "53" "63" "73" "83"
[3,] "54" "64" "74" "84"
[4,] "55" "65" "75" "85"
[5,] "57" "67" "77" "87"
[6,] "58" "68" "78" "88"
> colplist
$`Col Parent1`
+ Col Child1 (1, 3)
+ Col Child2 (2, 3)
+ Col Child3 (3, 3)
+ Col Child4 (4, 3)

$`Col Parent2`
+ Col Child1 (5, 3)
+ Col Child2 (6, 3)
+ Col Child3 (7, 3)
+ Col Child4 (8, 3)
```

```
> res
      UNKNOWN           UNKNOWN     UNKNOWN    UNKNOWN           UNKNOWN
1 Col Parent1 Row Super-Parent Row Parent1 Row Child1 Row Child-Child1
2 Col Parent1 Row Super-Parent Row Parent1 Row Child1 Row Child-Child2
3 Col Parent1 Row Super-Parent Row Parent1 Row Child2 Row Child-Child1
4 Col Parent1 Row Super-Parent Row Parent1 Row Child2 Row Child-Child2
5 Col Parent1 Row Super-Parent Row Parent2 Row Child1 Row Child-Child1
6 Col Parent1 Row Super-Parent Row Parent2 Row Child1 Row Child-Child2
  Col Child1 Col Child2 Col Child3 Col Child4
1         12         22         32         42
2         13         23         33         43
3         14         24         34         44
4         15         25         35         45
5         17         27         37         47
6         18         28         38         48
```

8.13 ToyExFindSingleTable.csv

	1	2	3	4	5	6
1	MISC INFORMATION					
2	MISC INFORMATION					
3		Column 1	Column 2	Column 3	Column 4	
4	Row 1	10	20	30	40	
5	Row 2	11	21	31	41	
6	Row 3	12	22	32	42	
7	Row 4	13	23	33	43	
8	MISC INFORMATION		MISC INFORMATION			
9	MISC INFORMATION		MISC INFORMATION			

```
> rowData
[1] 4 7
> colData
[1] 2 5
> rowslist
$label
[1] 1 2 3

$data
[1] 4 5 6 7

> colslist
$label
[1] 1

$data
[1] 2 3 4 5

> plist
$rows
[1] 1 2 3 4

$cols
[1] 1

> res
Row 1 Row 2 Row 3 Row 4
    1     2     3     4
> rowplist
Row 1 Row 2 Row 3 Row 4
    1     2     3     4
> rowvecs
     [,1]
[1,] "Row 1"
[2,] "Row 2"
[3,] "Row 3"
[4,] "Row 4"
> matColLabel
     V2          V3          V4          V5
[1,] NA          NA          NA          NA
[2,] NA          NA          NA          NA
[3,] "Column 1" "Column 2" "Column 3" "Column 4"
> cursub
```

```
        V2         V3         V4         V5
"Column 1" "Column 2" "Column 3" "Column 4"
> currow[curcols]
        V2         V3         V4         V5
"Column 1" "Column 2" "Column 3" "Column 4"
> matColLabel
     V2         V3         V4         V5
[1,] NA         NA         NA         NA
[2,] NA         NA         NA         NA
[3,] "Column 1" "Column 2" "Column 3" "Column 4"
> matColLabel
     V2         V3         V4         V5
[1,] NA         NA         NA         NA
[2,] NA         NA         NA         NA
[3,] "Column 1" "Column 2" "Column 3" "Column 4"
> matColLabel
     V2         V3         V4         V5
[1,] NA         NA         NA         NA
[2,] NA         NA         NA         NA
[3,] "Column 1" "Column 2" "Column 3" "Column 4"
> plist
$rows
[1] 1 2 3 4

$cols
[1] 3

> res
Column 1 Column 2 Column 3 Column 4
       1        2        3        4
> plist
Column 1 Column 2 Column 3 Column 4
       1        2        3        4
> matData
     V2   V3   V4   V5
[1,] "10" "20" "30" "40"
[2,] "11" "21" "31" "41"
[3,] "12" "22" "32" "42"
[4,] "13" "23" "33" "43"
> datbit
     V2   V3   V4   V5
[1,] "10" "20" "30" "40"
[2,] "11" "21" "31" "41"
[3,] "12" "22" "32" "42"
[4,] "13" "23" "33" "43"
> colplist
Column 1 Column 2 Column 3 Column 4
       1        2        3        4
> res
  UNKNOWN Column 1 Column 2 Column 3 Column 4
1   Row 1       10       20       30       40
2   Row 2       11       21       31       41
3   Row 3       12       22       32       42
4   Row 4       13       23       33       43
```

8.14 ToyExIrregularColumnLabels.csv

	1	2	3	4	5	6	7
1		Col Parent1			Col Parent2		
2		Col Child1	Col Child2	Col Child3	Col Child1	Col Child2	Col Child4
3	Row 1	10	20	30	50	60	80
4	Row 2	11	21	31	51	61	81
5	Row 3	12	22	32	52	62	82
6	Row 4	13	23	33	53	63	83

```
> rowData
[1] 3 6
> colData
[1] 2 7
> rowslist
$label
[1] 1 2

$data
[1] 3 4 5 6

> colslist
$label
[1] 1

$data
[1] 2 3 4 5 6 7

> plist
$rows
[1] 1 2 3 4

$cols
[1] 1

> res
Row 1 Row 2 Row 3 Row 4
    1     2     3     4
> rowplist
Row 1 Row 2 Row 3 Row 4
    1     2     3     4
> rowvecs
     [,1]
[1,] "Row 1"
[2,] "Row 2"
[3,] "Row 3"
[4,] "Row 4"
> matColLabel
     V2            V3           V4           V5            V6
[1,] "Col Parent1" NA           NA           "Col Parent2" NA
[2,] "Col Child1"  "Col Child2" "Col Child3" "Col Child1"  "Col Child2"
     V7
[1,] NA
[2,] "Col Child4"
> cursub
          V2            V3            V4
"Col Parent1"           NA            NA
```

```
> currow[curcols]
           V2            V3            V4
"Col Parent1"            NA            NA
> cursub
           V5            V6            V7
"Col Parent2"            NA            NA
> currow[curcols]
           V5            V6            V7
"Col Parent2"            NA            NA
> cursub
         V2           V3           V4           V5           V6           V7
"Col Child1" "Col Child2" "Col Child3" "Col Child1" "Col Child2" "Col Child4"
> currow[curcols]
         V2           V3           V4           V5           V6           V7
"Col Child1" "Col Child2" "Col Child3" "Col Child1" "Col Child2" "Col Child4"
> matColLabel
     V2            V3           V4           V5            V6
[1,] "Col Parent1" NA           NA           "Col Parent2" NA
[2,] "Col Child1"  "Col Child2" "Col Child3" "Col Child1"  "Col Child2"
     V7
[1,] NA
[2,] "Col Child4"
> matColLabel
     V2            V3           V4           V5            V6
[1,] "Col Parent1" NA           NA           "Col Parent2" NA
[2,] "Col Child1"  "Col Child2" "Col Child3" "Col Child1"  "Col Child2"
     V7
[1,] NA
[2,] "Col Child4"
> matColLabel
     V2            V3           V4           V5            V6
[1,] "Col Parent1" NA           NA           "Col Parent2" NA
[2,] "Col Child1"  "Col Child2" "Col Child3" "Col Child1"  "Col Child2"
     V7
[1,] NA
[2,] "Col Child4"
> res
$`Col Parent1`
$`Col Parent1`$rows
[1] 1 2 3

$`Col Parent1`$cols
[1] 2


$`Col Parent2`
$`Col Parent2`$rows
[1] 4 5 6

$`Col Parent2`$cols
[1] 2


> plist
$rows
[1] 1 2 3
```

```
$cols
[1] 2

> res
Col Child1 Col Child2 Col Child3
         1          2          3
> plist
$rows
[1] 4 5 6

$cols
[1] 2

> res
Col Child1 Col Child2 Col Child4
         4          5          6
> plist
Col Child1 Col Child2 Col Child3
         1          2          3
> matData
     V2   V3   V4   V5   V6   V7
[1,] "10" "20" "30" "50" "60" "80"
[2,] "11" "21" "31" "51" "61" "81"
[3,] "12" "22" "32" "52" "62" "82"
[4,] "13" "23" "33" "53" "63" "83"
> datbit
     V2   V3   V4
[1,] "10" "20" "30"
[2,] "11" "21" "31"
[3,] "12" "22" "32"
[4,] "13" "23" "33"
> plist
Col Child1 Col Child2 Col Child4
         4          5          6
> matData
     V2   V3   V4   V5   V6   V7
[1,] "10" "20" "30" "50" "60" "80"
[2,] "11" "21" "31" "51" "61" "81"
[3,] "12" "22" "32" "52" "62" "82"
[4,] "13" "23" "33" "53" "63" "83"
> datbit
     V5   V6   V7
[1,] "50" "60" "80"
[2,] "51" "61" "81"
[3,] "52" "62" "82"
[4,] "53" "63" "83"
> colplist
$`Col Parent1`
+ Col Child1 (1, 2)
+ Col Child2 (2, 2)
+ Col Child3 (3, 2)

$`Col Parent2`
+ Col Child1 (4, 2)
+ Col Child2 (5, 2)
+ Col Child4 (6, 2)
```

```
> res
      UNKNOWN UNKNOWN Col Child1 Col Child2 Col Child3 Col Child4
1 Col Parent1   Row 1         10         20         30         NA
2 Col Parent1   Row 2         11         21         31         NA
3 Col Parent1   Row 3         12         22         32         NA
4 Col Parent1   Row 4         13         23         33         NA
5 Col Parent2   Row 1         50         60         NA         80
6 Col Parent2   Row 2         51         61         NA         81
```

8.15 ToyExMisalignedColumnLabel.csv

	1	2	3	4	5	6	7	8	9
1			Col Parent1				Col Parent2		
2		Col Child1	Col Child2	Col Child3	Col Child4	Col Child1	Col Child2	Col Child3	Col Child4
3	Row 1	10	20	30	40	50	60	70	80
4	Row 2	11	21	31	41	51	61	71	81
5	Row 3	12	22	32	42	52	62	72	82
6	Row 4	13	23	33	43	53	63	73	83

```
> rowData
[1] 3 6
> colData
[1] 2 9
> rowslist
$label
[1] 1 2

$data
[1] 3 4 5 6

> colslist
$label
[1] 1

$data
[1] 2 3 4 5 6 7 8 9

> plist
$rows
[1] 1 2 3 4

$cols
[1] 1

> res
Row 1 Row 2 Row 3 Row 4
    1     2     3     4
> rowplist
Row 1 Row 2 Row 3 Row 4
    1     2     3     4
> rowvecs
     [,1]
[1,] "Row 1"
[2,] "Row 2"
[3,] "Row 3"
[4,] "Row 4"
> matColLabel
     V2           V3            V4           V5           V6
[1,] NA           "Col Parent1" NA           NA           NA
[2,] "Col Child1" "Col Child2"  "Col Child3" "Col Child4" "Col Child1"
     V7
[1,] "Col Parent2"
[2,] "Col Child2"
> cursub
          V2            V3            V4            V5
          NA "Col Parent1"            NA            NA
> currow[curcols]
```

```
           V2            V3            V4            V5
"Col Parent1"            NA            NA            NA
> cursub
           V6            V7            V8            V9
           NA "Col Parent2"            NA            NA
> currow[curcols]
           V6            V7            V8            V9
"Col Parent2"            NA            NA            NA
> cursub
          V2           V3           V4           V5
"Col Child1" "Col Child2" "Col Child3" "Col Child4"
> currow[curcols]
          V2           V3           V4           V5
"Col Child1" "Col Child2" "Col Child3" "Col Child4"
> cursub
          V6           V7           V8           V9
"Col Child1" "Col Child2" "Col Child3" "Col Child4"
> currow[curcols]
          V6           V7           V8           V9
"Col Child1" "Col Child2" "Col Child3" "Col Child4"
> matColLabel
     V2            V3           V4           V5           V6
[1,] "Col Parent1" NA           NA           NA           "Col Parent2"
[2,] "Col Child1"  "Col Child2" "Col Child3" "Col Child4" "Col Child1"
     V7
[1,] NA
[2,] "Col Child2"
> matColLabel
     V2            V3           V4           V5           V6
[1,] "Col Parent1" NA           NA           NA           "Col Parent2"
[2,] "Col Child1"  "Col Child2" "Col Child3" "Col Child4" "Col Child1"
     V7
[1,] NA
[2,] "Col Child2"
> matColLabel
     V2            V3           V4           V5           V6
[1,] "Col Parent1" NA           NA           NA           "Col Parent2"
[2,] "Col Child1"  "Col Child2" "Col Child3" "Col Child4" "Col Child1"
     V7
[1,] NA
[2,] "Col Child2"
> res
$`Col Parent1`
$`Col Parent1`$rows
[1] 1 2 3 4

$`Col Parent1`$cols
[1] 2


$`Col Parent2`
$`Col Parent2`$rows
[1] 5 6 7 8

$`Col Parent2`$cols
[1] 2
```

```
> plist
$rows
[1] 1 2 3 4

$cols
[1] 2

> res
Col Child1 Col Child2 Col Child3 Col Child4
         1          2          3          4
> plist
$rows
[1] 5 6 7 8

$cols
[1] 2

> res
Col Child1 Col Child2 Col Child3 Col Child4
         5          6          7          8
> plist
Col Child1 Col Child2 Col Child3 Col Child4
         1          2          3          4
> matData
     V2   V3   V4   V5   V6   V7
[1,] "10" "20" "30" "40" "50" "60"
[2,] "11" "21" "31" "41" "51" "61"
[3,] "12" "22" "32" "42" "52" "62"
[4,] "13" "23" "33" "43" "53" "63"
> datbit
     V2   V3   V4   V5
[1,] "10" "20" "30" "40"
[2,] "11" "21" "31" "41"
[3,] "12" "22" "32" "42"
[4,] "13" "23" "33" "43"
> plist
Col Child1 Col Child2 Col Child3 Col Child4
         5          6          7          8
> matData
     V2   V3   V4   V5   V6   V7
[1,] "10" "20" "30" "40" "50" "60"
[2,] "11" "21" "31" "41" "51" "61"
[3,] "12" "22" "32" "42" "52" "62"
[4,] "13" "23" "33" "43" "53" "63"
> datbit
     V6   V7   V8   V9
[1,] "50" "60" "70" "80"
[2,] "51" "61" "71" "81"
[3,] "52" "62" "72" "82"
[4,] "53" "63" "73" "83"
> colplist
$`Col Parent1`
+ Col Child1 (1, 2)
+ Col Child2 (2, 2)
+ Col Child3 (3, 2)
+ Col Child4 (4, 2)
```

```
$`Col Parent2`
+ Col Child1 (5, 2)
+ Col Child2 (6, 2)
+ Col Child3 (7, 2)
+ Col Child4 (8, 2)

> res
      UNKNOWN UNKNOWN Col Child1 Col Child2 Col Child3 Col Child4
1 Col Parent1   Row 1         10         20         30         40
2 Col Parent1   Row 2         11         21         31         41
3 Col Parent1   Row 3         12         22         32         42
4 Col Parent1   Row 4         13         23         33         43
5 Col Parent2   Row 1         50         60         70         80
6 Col Parent2   Row 2         51         61         71         81
```

8.16 ToyExMisalignedColumnLabel2.csv

	1	2	3	4	5	6	7	8	9
1				Col Super−Parent					
2			Col Parent1				Col Parent2		
3		Col Child1	Col Child2	Col Child3	Col Child4	Col Child1	Col Child2	Col Child3	Col Child4
4	Row 1	10	20	30	40	50	60	70	80
5	Row 2	11	21	31	41	51	61	71	81
6	Row 3	12	22	32	42	52	62	72	82
7	Row 4	13	23	33	43	53	63	73	83

```
> rowData
[1] 4 7
> colData
[1] 2 9
> rowslist
$label
[1] 1 2 3

$data
[1] 4 5 6 7

> colslist
$label
[1] 1

$data
[1] 2 3 4 5 6 7 8 9

> plist
$rows
[1] 1 2 3 4

$cols
[1] 1

> res
Row 1 Row 2 Row 3 Row 4
    1     2     3     4
> rowplist
Row 1 Row 2 Row 3 Row 4
    1     2     3     4
> rowvecs
     [,1]
[1,] "Row 1"
[2,] "Row 2"
[3,] "Row 3"
[4,] "Row 4"
> matColLabel
     V2           V3            V4                 V5           V6
[1,] NA           NA            "Col Super-Parent" NA           NA
[2,] NA           "Col Parent1" NA                 NA           NA
[3,] "Col Child1" "Col Child2"  "Col Child3"       "Col Child4" "Col Child1"
     V7
[1,] NA
[2,] "Col Parent2"
[3,] "Col Child2"
> cursub
```

```
               V2                V3                V4                V5
               NA                NA "Col Super-Parent"                NA
               V6                V7
               NA                NA
> currow[curcols]
               V2                V3                V4                V5
"Col Super-Parent"                NA                NA                NA
               V6                V7
               NA                NA
> cursub
          V2            V3            V4            V5
          NA "Col Parent1"            NA            NA
> currow[curcols]
          V2            V3            V4            V5
"Col Parent1"            NA            NA            NA
> cursub
          V6            V7            V8            V9
          NA "Col Parent2"            NA            NA
> currow[curcols]
          V6            V7            V8            V9
"Col Parent2"            NA            NA            NA
> cursub
         V2           V3           V4           V5
"Col Child1" "Col Child2" "Col Child3" "Col Child4"
> currow[curcols]
         V2           V3           V4           V5
"Col Child1" "Col Child2" "Col Child3" "Col Child4"
> cursub
         V6           V7           V8           V9
"Col Child1" "Col Child2" "Col Child3" "Col Child4"
> currow[curcols]
         V6           V7           V8           V9
"Col Child1" "Col Child2" "Col Child3" "Col Child4"
> matColLabel
     V2                 V3           V4           V5           V6
[1,] "Col Super-Parent" NA           NA           NA           NA
[2,] "Col Parent1"      NA           NA           NA           "Col Parent2"
[3,] "Col Child1"       "Col Child2" "Col Child3" "Col Child4" "Col Child1"
     V7
[1,] NA
[2,] NA
[3,] "Col Child2"
> matColLabel
     V2                 V3           V4           V5           V6
[1,] "Col Super-Parent" NA           NA           NA           NA
[2,] "Col Parent1"      NA           NA           NA           "Col Parent2"
[3,] "Col Child1"       "Col Child2" "Col Child3" "Col Child4" "Col Child1"
     V7
[1,] NA
[2,] NA
[3,] "Col Child2"
> matColLabel
     V2                 V3           V4           V5           V6
[1,] "Col Super-Parent" NA           NA           NA           NA
[2,] "Col Parent1"      NA           NA           NA           "Col Parent2"
[3,] "Col Child1"       "Col Child2" "Col Child3" "Col Child4" "Col Child1"
     V7
```

```
[1,] NA
[2,] NA
[3,] "Col Child2"
> res
$`Col Super-Parent`
$`Col Super-Parent`$rows
[1] 1 2 3 4 5 6 7 8

$`Col Super-Parent`$cols
[1] 2 3


> res
$`Col Parent1`
$`Col Parent1`$rows
[1] 1 2 3 4

$`Col Parent1`$cols
[1] 3


$`Col Parent2`
$`Col Parent2`$rows
[1] 5 6 7 8

$`Col Parent2`$cols
[1] 3


> plist
$rows
[1] 1 2 3 4

$cols
[1] 3

> res
Col Child1 Col Child2 Col Child3 Col Child4
         1          2          3          4
> plist
$rows
[1] 5 6 7 8

$cols
[1] 3

> res
Col Child1 Col Child2 Col Child3 Col Child4
         5          6          7          8
> plist
Col Child1 Col Child2 Col Child3 Col Child4
         1          2          3          4
> matData
     V2   V3   V4   V5   V6   V7
[1,] "10" "20" "30" "40" "50" "60"
[2,] "11" "21" "31" "41" "51" "61"
[3,] "12" "22" "32" "42" "52" "62"
```

```
[4,] "13" "23" "33" "43" "53" "63"
> datbit
     V2   V3   V4   V5
[1,] "10" "20" "30" "40"
[2,] "11" "21" "31" "41"
[3,] "12" "22" "32" "42"
[4,] "13" "23" "33" "43"
> plist
Col Child1 Col Child2 Col Child3 Col Child4
         5          6          7          8
> matData
     V2   V3   V4   V5   V6   V7
[1,] "10" "20" "30" "40" "50" "60"
[2,] "11" "21" "31" "41" "51" "61"
[3,] "12" "22" "32" "42" "52" "62"
[4,] "13" "23" "33" "43" "53" "63"
> datbit
     V6   V7   V8   V9
[1,] "50" "60" "70" "80"
[2,] "51" "61" "71" "81"
[3,] "52" "62" "72" "82"
[4,] "53" "63" "73" "83"
> colplist
$`Col Super-Parent`
+ Col Parent1 (1, 2)
- + Col Child1 (1, 3)
- + Col Child2 (2, 3)
- + Col Child3 (3, 3)
- + Col Child4 (4, 3)
+ Col Parent2 (5, 2)
- + Col Child1 (5, 3)
- + Col Child2 (6, 3)
- + Col Child3 (7, 3)
- + Col Child4 (8, 3)

> res
           UNKNOWN     UNKNOWN UNKNOWN Col Child1 Col Child2 Col Child3
1 Col Super-Parent Col Parent1   Row 1         10         20         30
2 Col Super-Parent Col Parent1   Row 2         11         21         31
3 Col Super-Parent Col Parent1   Row 3         12         22         32
4 Col Super-Parent Col Parent1   Row 4         13         23         33
5 Col Super-Parent Col Parent2   Row 1         50         60         70
6 Col Super-Parent Col Parent2   Row 2         51         61         71
  Col Child4
1         40
2         41
3         42
4         43
5         80
6         81
```

8.17 ToyExMismatchedColumnLabel.csv

	1	2	3	4	5	6	7	8	9
1		Col Child1		Col Child2		Col Child3		Col Child4	
2	Row 1		10		20		30		40
3	Row 2		11		21		31		41
4	Row 3		12		22		32		42
5	Row 4		13		23		33		43

```
> rowData
[1] 2 5
> colData
[1] 3 9
> rowslist
$label
[1] 1

$data
[1] 2 3 4 5

> colslist
$label
[1] 1 2

$data
[1] 3 4 5 6 7 8 9

> plist
$rows
[1] 1 2 3 4

$cols
[1] 1

> res
Row 1 Row 2 Row 3 Row 4
    1     2     3     4
> rowplist
Row 1 Row 2 Row 3 Row 4
    1     2     3     4
> rowvecs
     [,1]
[1,] "Row 1"
[2,] "Row 2"
[3,] "Row 3"
[4,] "Row 4"
> matColLabel
     V2           V4           V6           V8
[1,] "Col Child1" "Col Child2" "Col Child3" "Col Child4"
> cursub
          V2           V4           V6           V8
"Col Child1" "Col Child2" "Col Child3" "Col Child4"
> currow[curcols]
          V2           V4           V6           V8
"Col Child1" "Col Child2" "Col Child3" "Col Child4"
> matColLabel
     V2           V4           V6           V8
[1,] "Col Child1" "Col Child2" "Col Child3" "Col Child4"
```

```
> matColLabel
     V2           V4           V6           V8
[1,] "Col Child1" "Col Child2" "Col Child3" "Col Child4"
> matColLabel
     V2           V4           V6           V8
[1,] "Col Child1" "Col Child2" "Col Child3" "Col Child4"
> plist
$rows
[1] 1 2 3 4

$cols
[1] 1

> res
Col Child1 Col Child2 Col Child3 Col Child4
         1          2          3          4
> plist
Col Child1 Col Child2 Col Child3 Col Child4
         1          2          3          4
> matData
     V3   V5   V7   V9
[1,] "10" "20" "30" "40"
[2,] "11" "21" "31" "41"
[3,] "12" "22" "32" "42"
[4,] "13" "23" "33" "43"
> datbit
     V3   V5   V7   V9
[1,] "10" "20" "30" "40"
[2,] "11" "21" "31" "41"
[3,] "12" "22" "32" "42"
[4,] "13" "23" "33" "43"
> colplist
Col Child1 Col Child2 Col Child3 Col Child4
         1          2          3          4
> res
  UNKNOWN Col Child1 Col Child2 Col Child3 Col Child4
1   Row 1         10         20         30         40
2   Row 2         11         21         31         41
3   Row 3         12         22         32         42
4   Row 4         13         23         33         43
```

8.18 ToyExMultiRowColumnLabel.csv

	1	2	3	4	5	6
1		Column	Column	Column	Column	
2		Child1	Child2	Child3	Child4	
3	Row 1	10	20	30	40	
4	Row 2	11	21	31	41	
5	Row 3	12	22	32	42	
6	Row 4	13	23	33	43	

```
> rowData
[1] 3 6
> colData
[1] 2 5
> rowslist
$label
[1] 1 2

$data
[1] 3 4 5 6

> colslist
$label
[1] 1

$data
[1] 2 3 4 5

> plist
$rows
[1] 1 2 3 4

$cols
[1] 1

> res
Row 1 Row 2 Row 3 Row 4
    1     2     3     4
> rowplist
Row 1 Row 2 Row 3 Row 4
    1     2     3     4
> rowvecs
     [,1]
[1,] "Row 1"
[2,] "Row 2"
[3,] "Row 3"
[4,] "Row 4"
> matColLabel
     V2       V3       V4       V5
[1,] "Column" "Column" "Column" "Column"
[2,] "Child1" "Child2" "Child3" "Child4"
> cursub
      V2
"Column"
> currow[curcols]
      V2
```

```
"Column"
> cursub
      V3
"Column"
> currow[curcols]
      V3
"Column"
> cursub
      V4
"Column"
> currow[curcols]
      V4
"Column"
> cursub
      V5
"Column"
> currow[curcols]
      V5
"Column"
> cursub
      V2       V3       V4       V5
"Child1" "Child2" "Child3" "Child4"
> currow[curcols]
      V2       V3       V4       V5
"Child1" "Child2" "Child3" "Child4"
> matColLabel
     V2       V3       V4       V5
[1,] "Column" "Column" "Column" "Column"
[2,] "Child1" "Child2" "Child3" "Child4"
> matColLabel
     V2       V3       V4       V5
[1,] "Column" "Column" "Column" "Column"
[2,] "Child1" "Child2" "Child3" "Child4"
> matColLabel
     V2              V3              V4              V5
[1,] "Column Child1" "Column Child2" "Column Child3" "Column Child4"
> plist
$rows
[1] 1 2 3 4

$cols
[1] 1

> res
Column Child1 Column Child2 Column Child3 Column Child4
            1             2             3             4
> plist
Column Child1 Column Child2 Column Child3 Column Child4
            1             2             3             4
> matData
     V2   V3   V4   V5
[1,] "10" "20" "30" "40"
[2,] "11" "21" "31" "41"
[3,] "12" "22" "32" "42"
[4,] "13" "23" "33" "43"
> datbit
     V2   V3   V4   V5
```

```
[1,] "10" "20" "30" "40"
[2,] "11" "21" "31" "41"
[3,] "12" "22" "32" "42"
[4,] "13" "23" "33" "43"
> colplist
Column Child1 Column Child2 Column Child3 Column Child4
            1             2             3             4
> res
  UNKNOWN Column Child1 Column Child2 Column Child3 Column Child4
1   Row 1            10            20            30            40
2   Row 2            11            21            31            41
3   Row 3            12            22            32            42
4   Row 4            13            23            33            43
```