;Data A;

Input City $12. Index;

Datalines;

Adelaide 85

Beijing 90

Copenhagen 65

Doha 56

Dubai 75

Dublin 45

;

Proc Print Noobs;

Run;

Data B;

Input City $12. Index;

Datalines;

Hong Kong 83

Johannesburg 35

Manila 41

Moscow 48

Mumbai 83

Munich 65

;

Proc Print Noobs;

Run;

Data Concatenate\_AB;

Set A B;

Run;

Proc Print Noobs;

Run;

Data A;

Input Index;

Datalines;

45

56

65

75

85

90

;

Proc Print Noobs;

Run;

Data B;

Input Index;

Datalines;

35

41

48

65

83

83

;

Proc Print Noobs;

Run;

Data Interleave\_AB;

Set A B;

By Index;

Run;

Proc Print Noobs;

Run;

Data X (rename=(Index=IndexA));

Set A;

Run;

Data Merge\_XB;

Merge X B;

Run;

Proc Print Noobs;

Run;

Title 'A';

Data A;

Input City $12. Index;

Datalines;

Adelaide 85

Beijing 90

Copenhagen 65

Doha 56

Dubai 75

Dublin 45

;

Proc Print;

Run;

Title 'A\_Alt';

Data A\_Alt;

Input City $12. Index;

Datalines;

Adelaide 65

Beijing 98

Copenhagen .

Copenhagen 65

Dubai 75

Dublin 95

Hong Kong 83

;

Proc Print;

Run;

Data A;

Update A A\_Alt;

By City;

Run;

Proc Print;

Run;

Title 'Master';

Data Master;

Set A;

Run;

Proc Print;

Run;

Title 'Master';

Data Master;

Input City $12. Index;

Datalines;

Adelaide 85

Beijing 90

Copenhagen 65

Doha 56

Dubai 75

Dublin 45

;

Proc Print;

Run;

Title 'A\_Alt';

Data A\_Alt;

Input City $12. Index;

Datalines;

Adelaide 65

Beijing 98

Copenhagen .

Copenhagen 65

Dubai 75

Dublin 95

Hong Kong 83

;

Proc Print;

Run;

Title 'Output';

Data Master;

Modify Master A\_Alt;

By City;

Run;

Proc Print;

Run;

/\*Concateation length and additional variable\*/

Data Customer\_X;

Input ID Gender $ Age Region $11.;

Datalines;

10004523 F 34 Portsmouth

10002342 F 45 Southampton

10002462 M 36 Leeds

10002328 M 65 Durham

10006345 M 56 Bristol

10005234 M 19 Newcastle

10005325 F 23 London

;

Proc Print;

Run;

Data Customer\_Y;

Input ID Gender $ Age Region $12. Dependents;

Datalines;

10005296 F 24 Shefield 1

10001002 F 65 Liverpool 0

10003407 F 43 Cardiff 0

10009832 M 76 Bath 0

10000086 F 21 Sunderland 0

10002349 M 27 London 2

10008740 M 40 Birmingham 3

;

Proc Print;

Run;

Data Customer;

Set Customer\_X Customer\_Y;

Run;

Proc Print;

Run;

/\*Fig 7\*/

Data Customer\_X;

Input ID Gender $ Age Region $11.;

Datalines;

10004523 F 34 Portsmouth

10002342 F 45 Southampton

10002462 M 36 Leeds

10002328 M 65 Durham

10006345 M 56 Bristol

10005234 M 19 Newcastle

10005325 F 23 London

;

Proc Print;

Run;

Data Customer\_Y;

Input ID $ Gender $ Age Region $12. Dependents;

Datalines;

10005296 F 24 Shefield 1

10001002 F 65 Liverpool 0

10003407 F 43 Cardiff 0

10009832 M 76 Bath 0

10000086 F 21 Sunderland 0

10002349 M 27 London 2

10008740 M 40 Birmingham 3

;

Proc Print;

Run;

Data Customer;

Set Customer\_X Customer\_Y;

Run;

Proc Print;

Run;

/\*\*\*Test of length change as part of concatenation\*\*\*\*/

Data X;

Length ID 8.;

Input ID 1-8 Region $5.;

Datalines;

10004523 Bath

10002342 Leeds

;

Proc Print;

Run;

Data Y;

Length ID 6.;

Input ID Region $10.;

Datalines;

100296 Newcastle

101002 Birmingham

;

Proc Print;

Run;

/\* Data XY; \*/

/\* Set X Y; \*/

/\* Run; \*/

/\* \*/

/\* Proc Print; \*/

/\* Run; \*/

Data XY;

Set Y X;

Run;

Proc Print;

Run;

Data XY;

Set Y X;

Length ID 8.;

Length Region $12.;

Run;

/\*Fig 11. Proc Append - Tables are same as in Fig 1. No need to resubmit them\*/

Data A;

Input City $12. Index;

Datalines;

Adelaide 85

Beijing 90

Copenhagen 65

Doha 56

Dubai 75

Dublin 45

;

Proc Print Noobs;

Run;

Data B;

Input City $12. Index;

Datalines;

Hong Kong 83

Johannesburg 35

Manila 41

Moscow 48

Mumbai 83

Munich 65

;

PROC APPEND Base = A Data = B;

RUN;

Proc Print;

Run;

/\*Fig 12 Proc Append when variables have different type and additional variable\*/

Data Customer\_X;

Input ID Gender $ Age Region $11.;

Datalines;

10004523 F 34 Portsmouth

10002342 F 45 Southampton

10002462 M 36 Leeds

10002328 M 65 Durham

10006345 M 56 Bristol

10005234 M 19 Newcastle

10005325 F 23 London

;

Proc Print;

Run;

Data Customer\_Y;

Input ID $ Gender $ Age Region $12. Dependents;

Datalines;

10005296 F 24 Shefield 1

10001002 F 65 Liverpool 0

10003407 F 43 Cardiff 0

10009832 M 76 Bath 0

10000086 F 21 Sunderland 0

10002349 M 27 London 2

10008740 M 40 Birmingham 3

;

Proc Print;

Run;

PROC APPEND Base = Customer\_X Data = Customer\_Y;

RUN;

Proc Print;

Run;

PROC APPEND Base = Customer\_X Data = Customer\_Y FORCE;

RUN;

Proc Print;

Run;

/\*Interleave\*/

Data A;

Input Index City $1. Sample Past;

Datalines;

45 A 500 43

56 B 500 50

65 C 600 58

75 D 600 68

85 E 600 82

90 F 500 94

;

Proc Print Noobs;

Run;

Data B;

Input Index City $2. Sample;

Datalines;

35 AA 600

41 BB 500

48 CC 500

65 DD 600

83 EE 600

83 FF 600

;

Proc Print Noobs;

Run;

Data Interleave\_AB;

Set A B;

By Index;

Run;

Proc Print Noobs;

Run;

/\*Merging\*/

Data A;

Input Index;

Datalines;

45

56

65

75

85

90

;

Proc Print Noobs;

Run;

Data B;

Input Index;

Datalines;

35

41

48

65

83

83

90

;

Proc Print Noobs;

Run;

Data Extra\_Observation;

Merge A B;

Run;

Proc Print Noobs;

Run;

/\*Fig 10. Adding a source variable\*/

Data Customer\_X;

Input ID Gender $ Age Region $11.;

Datalines;

10004523 F 34 Portsmouth

10002342 F 45 Southampton

10002462 M 36 Leeds

10002328 M 65 Durham

10006345 M 56 Bristol

10005234 M 19 Newcastle

10005325 F 23 London

;

Proc Print;

Run;

Data Customer\_Y;

Input ID Gender $ Age Region $12. Dependents;

Datalines;

10005296 F 24 Shefield 1

10001002 F 65 Liverpool 0

10003407 F 43 Cardiff 0

10009832 M 76 Bath 0

10000086 F 21 Sunderland 0

10002349 M 27 London 2

10008740 M 40 Birmingham 3

;

Proc Print;

Run;

Data Customer;

Set Customer\_X (in = a) Customer\_Y (in = b);

If a = 1 then

Source = "X";

Else Source = "Y";

Run;

Proc Print Noobs;

Run;

/\*Fig 16\*/

DATA A;

INPUT City $12. Index Prev\_yr\_index Housing Food Travel;

DATALINES;

Adelaide 85 83 35 10 10

Beijing 90 92 40 10 15

Copenhagen 65 64 25 15 10

Doha 56 50 30 15 5

Dubai 75 76 30 16 14

Dublin 45 43 30 10 8

Hong Kong 83 88 45 5 10

Johannesburg 35 40 45 5 5

Manila 41 42 25 10 15

Moscow 48 53 40 20 5

;

Proc Print Noobs;

Run;

DATA B;

INPUT City $12. Utility Education Leisure Other;

DATALINES;

Adelaide 9 14 10 12

Beijing 10 18 5 2

Copenhagen 10 12 12 16

Doha 10 10 20 10

Dubai 10 20 8 2

Dublin 12 10 15 15

Hong Kong 15 15 9 1

Johannesburg 15 15 10 5

Manila 15 20 10 5

Moscow 5 10 10 10

;

Proc Print Noobs;

Run;

/\*Fig 17\*/

Data Cost\_Living;

Merge A B;

Run;

Proc Print Noobs;

Run;

/\*Fig 18\*/

DATA B;

INPUT City $12. Utility Education Leisure Other;

DATALINES;

Adelaide 9 14 10 12

Beijing 10 18 5 2

Copenhagen 10 12 12 16

Dublin 12 10 15 15

Hong Kong 15 15 9 1

Johannesburg 15 15 10 5

Manila 15 20 10 5

Moscow 5 10 10 10

;

Data Cost\_Living;

Merge A B;

Run;

Data Cost\_Living;

Merge A B;

By City;

Run;

Proc Print;

Run;

/\*Fig 20 and 21\*/

DATA A;

INPUT City $12. Index Prev\_yr\_index Housing Food Travel;

DATALINES;

Adelaide 85 83 35 10 10

Beijing 90 92 40 10 15

Copenhagen 65 64 25 15 10

Doha 56 50 30 15 5

Dubai 75 76 30 16 14

Dublin 45 43 30 10 8

Hong Kong 83 88 45 5 10

Johannesburg 35 40 45 5 5

Manila 41 42 25 10 15

Moscow 48 53 40 20 5

;

Proc Print Noobs;

Run;

DATA B;

INPUT City $12. Utility Education Leisure Other Travel;

DATALINES;

Adelaide 9 14 10 12 .

Beijing 10 18 5 2 .

Copenhagen 10 12 12 16 99

Dublin 12 10 15 15 99

Hong Kong 15 15 9 1 8

Johannesburg 15 15 10 5 7

Manila 15 20 10 5 5

Moscow 5 10 10 10 8

;

Proc Print;

Run;

Data Cost\_Living;

Merge A B;

By City;

Run;

Proc Print;

Run;

/\*Fig 22 and 23\*/

DATA A;

INPUT City $12. Index Housing Food;

DATALINES;

Adelaide 85 83 35

Beijing 90 92 40

Copenhagen 65 64 25

Dublin 45 43 30

Hong Kong 83 88 45

;

Proc Print;

Run;

DATA B;

INPUT City $12. Utility Education;

DATALINES;

Adelaide 9 14

Beijing 10 18

Copenhagen 10 12

Dublin 12 10

Hong Kong 15 15

;

Proc Print;

Run;

DATA C;

Format Index\_Date Date9.;

INPUT City $12. Index\_Date Date9. Index;

DATALINES;

Adelaide 01Jan2019 85

Beijing 01Jan2019 90

Beijing 01Jan2018 89

Copenhagen 01Jan2019 65

Dublin 01Jan2019 45

Hong Kong 01Jan2019 83

Hong Kong 01Jan2018 81

Hong Kong 01Jan2017 76

;

Proc Print;

Run;

Data ABC;

Merge A B C;

By City;

Run;

Proc Print;

Run;

/\*Fig 24\*/

DATA A;

Format Index\_Date Date9.;

INPUT City $12. Index Housing Index\_Date Date9.;

DATALINES;

Adelaide 85 83 01Jan2019

Beijing 90 92 01Jan2019

Beijing 90 90 01Jan2018

Copenhagen 65 64 01Jan2019

Dublin 45 43 01Jan2019

Hong Kong 83 88 01Jan2019

Hong Kong 83 88 01Jan2018

Hong Kong 82 88 01Jan2017

Hong Kong 82 87 01Jan2016

;

Proc Print;

Run;

DATA B;

INPUT City $12. Utility Education;

DATALINES;

Adelaide 9 14

Beijing 10 18

Copenhagen 10 12

Dublin 12 10

Hong Kong 15 15

;

Proc Print;

Run;

DATA C;

Format Index\_Date Date9.;

INPUT City $12. Index\_Date Date9. Index Food;

DATALINES;

Adelaide 01Jan2019 85 35

Beijing 01Jan2019 90 45

Beijing 01Jan2018 89 42

Copenhagen 01Jan2019 65 30

Dublin 01Jan2019 45 34

Hong Kong 01Jan2019 83 40

Hong Kong 01Jan2018 81 39

Hong Kong 01Jan2017 76 36

;

Proc Print;

Run;

/\*Fig 25\*/

Data ABC;

Merge A B C;

By City;

Run;

Proc Print;

Run;

/\*Fig 26\*/

Proc Sort Data = A;

By City Index\_Date;

Run;

Proc Sort Data = C;

By City Index\_Date;

Run;

Data AC;

Merge A C;

By City Index\_Date;

Run;

Proc Print;

Run;

/\*Fig 27\*/

DATA A;

Format Index\_Date Date9.;

INPUT City $12. Index Housing Index\_Date Date9.;

DATALINES;

Adelaide 85 83 01Jan2019

Copenhagen 65 64 01Jan2019

Hong Kong 83 88 01Jan2019

Hong Kong 83 88 01Jan2018

Hong Kong 82 88 01Jan2017

Hong Kong 82 87 01Jan2016

;

Proc Sort Data = A;

By City Index\_Date;

Run;

Proc Print Data = A;

Run;

DATA C;

Format Index\_Date Date9.;

INPUT City $12. Index\_Date Date9. Index Food;

DATALINES;

Adelaide 01Jan2019 85 35

Copenhagen 01Jan2019 65 30

hong Kong 01Jan2019 83 40

hong Kong 01Jan2018 81 39

hong Kong 01Jan2017 76 36

;

Proc Sort Data = C;

By City Index\_Date;

Run;

Proc Print;

Run;

Data AC;

Merge A C;

By City Index\_Date;

Run;

Proc Print;

Run;

/\*Fig 29\*/

Data hK;

Set AC;

Where City eq "hong Kong";

Run;

Proc Print;

Run;

PROC DATASETS LIBRARY=WORK;

MODIFY AC;

INDEX CREATE City;

RUN;

Proc contents data=work.AC centiles;

Run;

PROC DATASETS LIBRARY=WORK;

MODIFY AC;

INDEX DELETE City;

RUN;

PROC DATASETS LIBRARY=WORK;

MODIFY AC;

INDEX CREATE City / Unique;

RUN;

PROC DATASETS LIBRARY=WORK;

MODIFY AC;

Index Create Housing / Nomiss;

RUN;

Data Subset;

Set AC;

Where Housing LT 88 or Housing ne .;

Run;

/\*Fig 30\*/

Data Locked (Encrypt=yes PW=TestKey);

Set AC;

Run;

Data LockedAES (Encrypt=AES PW=TestKey);

Set AC;

Run;