Pearson

VBA + DDE

Automated Way to Populate Table into Formatted Excel

Skill Enrichment::2018

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Today's Topics

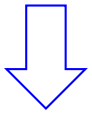
- Encounter problems
- One Solution
- Automated Solution
  - VBA Macros
  - Dynamic Data Exchange (**DDE**) in SAS
- SAS Macros & Demo
- Easter Egg
- Takeaways
- Q & A

Encounter Problems

- TELPAS standard setting tech report Appendix G

	N	Mean	Median	Roundup Median	Min	Max	Q1	Q3
I Raw Score	19	9.23	9.50	10	5.00	12.80	8.00	10.60
A Raw Score	19	16.91	16.80	17	12.00	21.60	15.00	18.90
AH Raw Score	19	22.33	22.70	23	19.30	25.20	20.40	23.70

(Source PDF file)



Round	Statistic	Intermediate	Advanced	Advanced High
1	Mean			
	Minimum			
	Q1			
	Median			
	Q3			
	Maximum			
2	Mean			
	Minimum			
	Q1			
	Median			
	Q3			
	Maximum			
3	Mean			
	Minimum			
	Q1			
	Median			
	Q3			
	Maximum			

(Appendix G table format)

One Solution

One solution:

1. Read-in data
2. Round value and transpose
3. Export to separate EXCEL tabs by domain and grade respectively
4. Manually format the excel tables respectively

- Realistic situation:

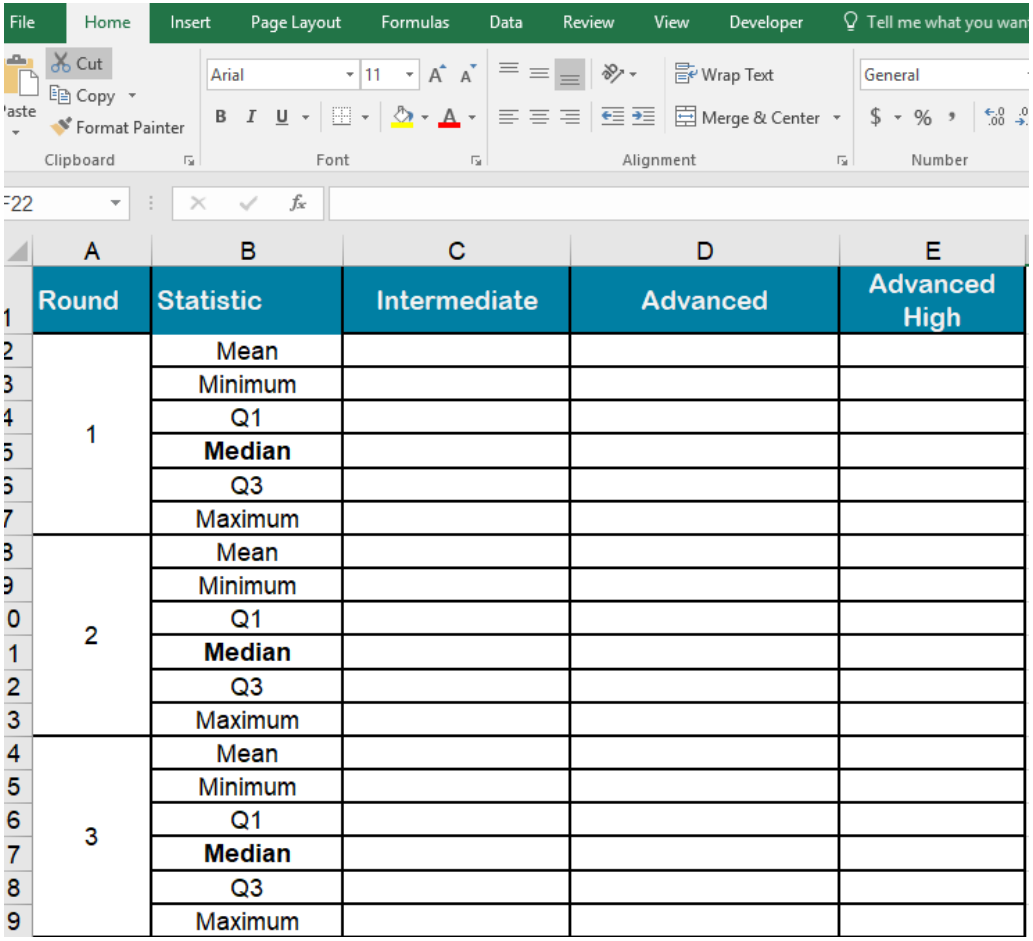
3 (Domain) x 4 (grade band) x 3 (round) = 42 tables

Automated Solution Summary

- Step 1: Create a single EXCEL table shell
- Step 2: Use VBA Macros to duplicate the same pre-formatted excel shell as needed
- Step 3: Use SAS DDE to paste summary statistics to pre-formatted excel table files

Automated Solution

Step 1: Create a single EXCEL table shell

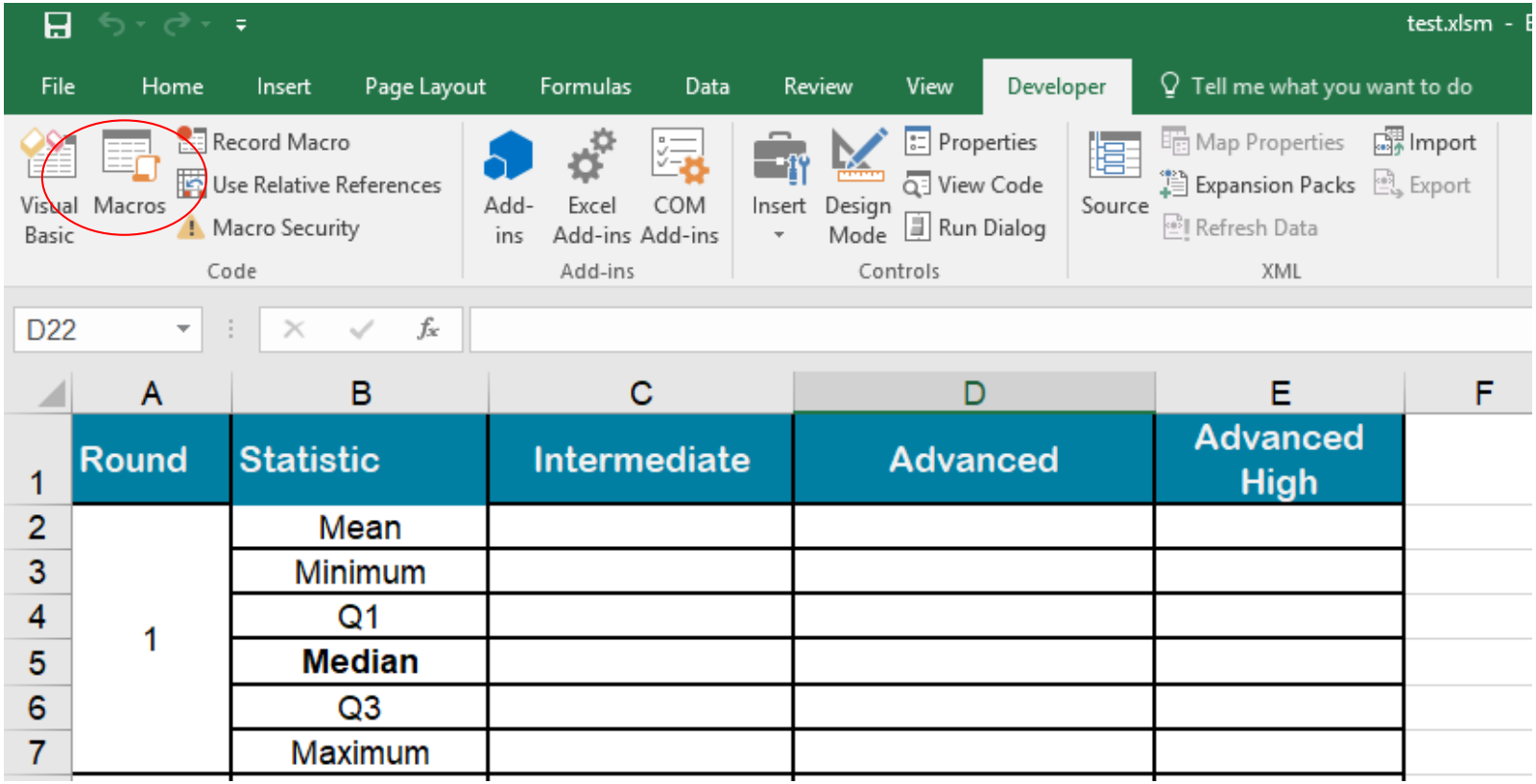


	A	B	C	D	E
1	**Round**	**Statistic**	**Intermediate**	**Advanced**	**Advanced High**
2	1	Mean			
3		Minimum			
4		Q1			
5		**Median**			
6		Q3			
7		Maximum			
8	2	Mean			
9		Minimum			
10		Q1			
11		**Median**			
12		Q3			
13		Maximum			
14	3	Mean			
15		Minimum			
16		Q1			
17		**Median**			
18		Q3			
19		Maximum			

Automated Solution

Step 2: VBA Macros

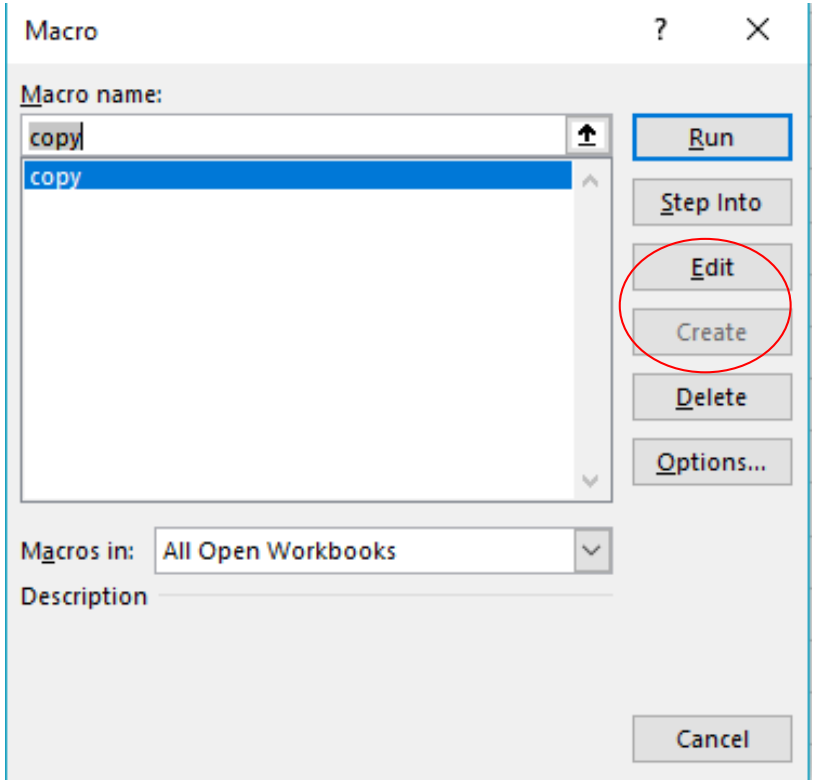
- Use VBA Macros to duplicate the same pre-formatted excel shell as needed.



	A	B	C	D	E	F
1	Round	Statistic	Intermediate	Advanced	Advanced High	
2	1	Mean				
3		Minimum				
4		Q1				
5		**Median**				
6		Q3				
7		Maximum				

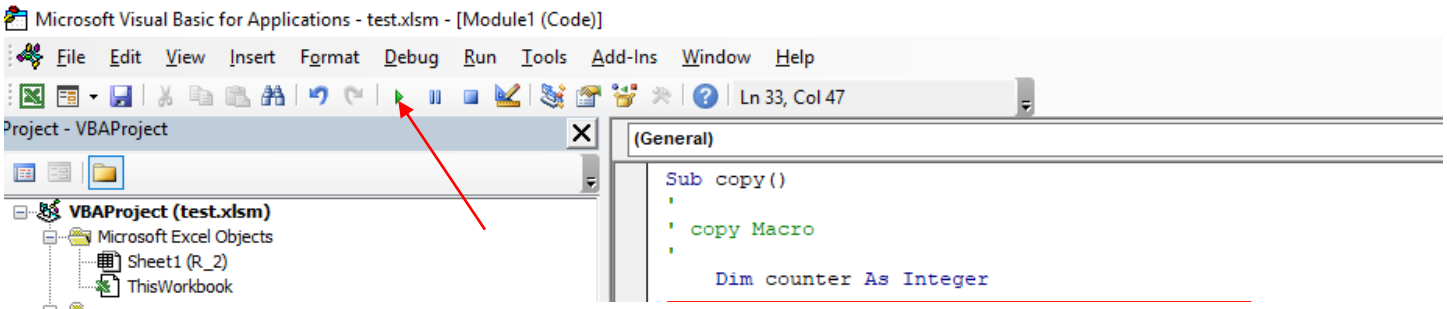
Automated Solution

Step 2: VBA Macros (cont.)

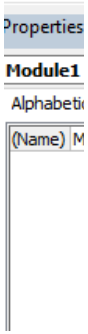


Automated Solution

Step 2: VBA Macros (cont.)

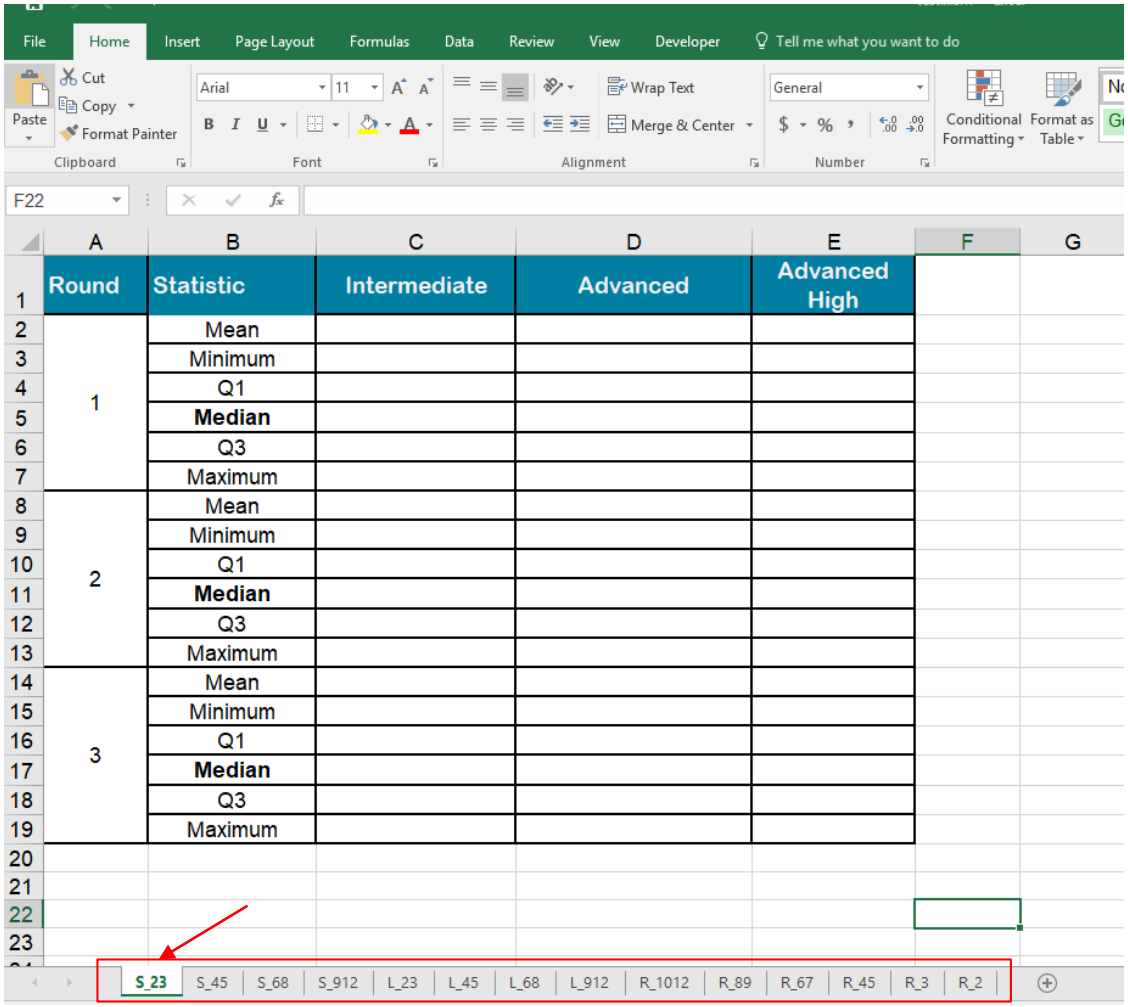



```
' Reading loop
    For counter = 1 To 5 Step 1

        If counter = 1 Then grade = "3"
        If counter = 2 Then grade = "45"
        If counter = 3 Then grade = "67"
        If counter = 4 Then grade = "89"
        If counter = 5 Then grade = "1012"

        Sheets("R_2").Select
        Sheets("R_2").copy Before:=Sheets(1)
        Sheets("R_2 (2)").Select
        Sheets("R_2 (2)").Name = "R_" & grade
    Next counter
```



Automated Solution

Step 2: VBA Macros (cont.)



	A	B	C	D	E	F	G
1	Round	Statistic	Intermediate	Advanced	Advanced High		
2	1	Mean					
3		Minimum					
4		Q1					
5		**Median**					
6		Q3					
7		Maximum					
8	2	Mean					
9		Minimum					
10		Q1					
11		**Median**					
12		Q3					
13		Maximum					
14	3	Mean					
15		Minimum					
16		Q1					
17		**Median**					
18		Q3					
19		Maximum					
20							
21							
22							
23							

Automated Solution
Step 2: VBA Macros (cont.)

- Advantage of using VBA Macros

1. Keep all the formats and fonts
2. Keep all the formulas inside the excel sheet
3. Keep all the dependent graphs within the excel sheet

Automated Solution

Step 3: Dynamic Data Exchange (DDE) in SAS

- Dynamic Data Exchange (DDE) is a method of dynamically exchanging information between Windows applications (SAS → EXCEL)

```
1  /* STEP 1: Turn on EXCEL program and open excel doc */
2  data _null_ ;
3      x "'C:\Program Files\Microsoft Office\root\Office16\EXCEL.EXE'
4         ""C:\temp\example.xlsx""";
5
6  /* STEP 2: Set up temp filename(out1) and
7     define tab name(tab1) and range(r2c3:r19c5) */
8  filename out1 dde "excel|tab1!r2c3:r19c5";
9
10 /* STEP 3: Output data to temp filename-out1 */
11 data dat1 ;set dat1;
12     file out1;
13     put v1 v2 v3;
14 run;
15
16 /* STEP 4: Close out DDE */
17 data _null_;
18     file cmds;
19     put '[close(0)]';
20     put '[quit()]';
21 run;
```

EXCEL .exe

EXCEL table shell (.xlsx)

temp dataset name

tab name

table range

Output variables

Automated Solution

Step 3: DDE in SAS (cont.)

Round	Statistic	Intermediate	Advanced	Advanced High
1	Mean	15.37	23.05	29.47
	Minimum	10	18	26
	Q1	14	21	28
	Median	**15**	**23**	**29**
	Q3	17	25	30
	Maximum	22	27	34
2	Mean	15.19	22.29	28
	Minimum	10	18	25
	Q1	14	21	27
	Median	**15**	**22**	**28**
	Q3	17	24	28
	Maximum	20	26	33
3	Mean	15.19	22.29	28
	Minimum	10	18	25
	Q1	14	21	27
	Median	**15**	**22**	**28**
	Q3	17	24	28
	Maximum	20	26	33

SAS Macros & Demo

4 Macros are developed:

1. Transpose/ modify data by Round
2. DDE Module
3. DDE to paste summary statistics to table (apply macro 1, 2)
4. Apply to multiple subjects and grade bands (apply macro 3)

SAS Macros & Demo

Macro 1: Transpose/ modify data by Round

```
/* Macro 1: Transpose/ modify data by Round Module */
%macro dat_trans(dat,out);

    /* dat - input data,
       out - output data */
```

N_	Mean_	SD_	median_	q1_	q3_	min_	max_	MEDIANR_	Level
19	9.2263157895	1.9401724165	9.5	8	10.6	5	12.8	10	I Raw Score
19	16.910526316	2.41405485	16.8	15	18.9	12	21.6	17	A Raw Score
19	22.326315789	1.8582674444	22.7	20.4	23.7	19.3	25.2	23	AH Raw Score

int	ad1	ad2
9.23	16.91	22.33
5	12	19
8	15	20
10	17	23
11	19	24
13	22	25

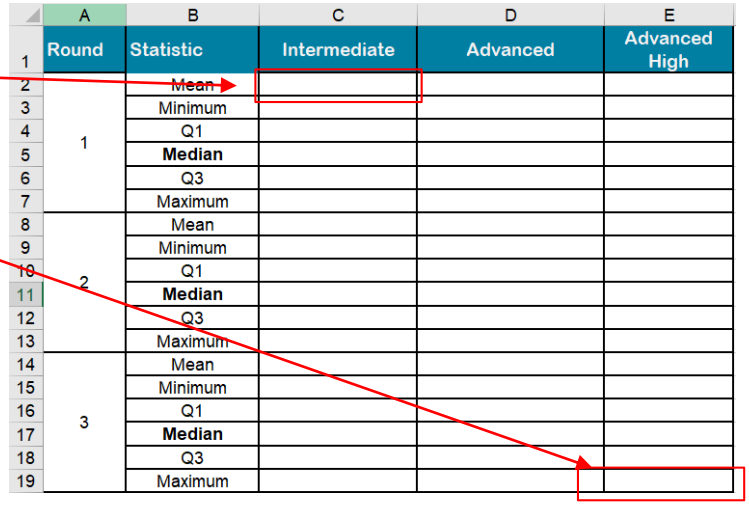
Round	Statistic	Intermediate	Advanced	Advanced High
1	Mean	9.23	16.91	22.33
	Minimum	5	12	19
	Q1	8	15	20
	Median	**10**	**17**	**23**
	Q3	11	19	24
	Maximum	13	22	25
2	Mean	9.54	16.79	21.97
	Minimum	6	12	19
	Q1	9	16	21
	Median	**10**	**17**	**23**
	Q3	10	18	23
	Maximum	13	21	25
3	Mean	9.54	16.79	21.97
	Minimum	6	12	19
	Q1	9	16	21
	Median	**10**	**17**	**23**
	Q3	10	18	23
	Maximum	13	21	25

	int	ad1	ad2
1	9.23	16.91	22.33
2	5	12	19
3	8	15	20
4	10	17	23
5	11	19	24
6	13	22	25
7	9.54	16.79	21.97
8	6	12	19
9	9	16	21
10	10	17	23
11	10	18	23
12	13	21	25
13	9.54	16.79	21.97
14	6	12	19
15	9	16	21
16	10	17	23
17	10	18	23
18	13	21	25

SAS Macros & Demo

Macro 2: DDE Module

```
/* Macro 2: DDE Module */
%macro dde_tbl(dat_dir, file_dir, xls_dir, filename, dat, sub, grade, vlist, r1, c1, r2, c2);

    /* dat_dir - sas data directory,
       file_dir- Formatted excel file directory ,
       xls_dir - EXCEL APP location (EXCEL.EXE) ,
       filename- Formatted excel file name,
       dat     - output SAS dataset (&sub.&grade.),
       vlist   - Output variable list (int ad1 ad2),
       subj    - Subject/domain ,
       grade   - Grade
       r1      - start row number
       c1      - start column number
       r2      - end row number
       c2      - end column number */
```



	A	B	C	D	E
1	Round	Statistic	Intermediate	Advanced	Advanced High
2	1	Mean			
3		Minimum			
4		Q1			
5		**Median**			
6		Q3			
7		Maximum			
8	2	Mean			
9		Minimum			
10		Q1			
11		**Median**			
12		Q3			
13		Maximum			
14	3	Mean			
15		Minimum			
16		Q1			
17		**Median**			
18		Q3			
19		Maximum			

SAS Macros & Demo (cont.)

Macro 3: DDE to paste summary statistics to table (apply macro 1,2)

```
/* Macro 3: DDE to paste summary statistics to table */
%macro paste_tbl(dat_dir, file_dir, xls_dir, filename, datname, sub, grade, vlist, r1, c1, r2, c2);

    /* dat_dir - sas data directory,
       file_dir- Formatted excel file directory ,
       xls_dir - EXCEL APP location (EXCEL.EXE) ,
       filename- Formatted excel file name,
       datname - part of sas data name (list68_sumstats_com_level_rd1.sas7bdat),
       vlist   - Output variable list (int ad1 ad2),
       sub     - Subject/domain ,
       grade   - Grade
       r1      - start row number
       c1      - start column number
       r2      - end row number
       c2      - end column number */
/** --- Example 1: Single subject + grade --- **/
%let sub      = L;
%let grade    = 23;
%let dat_dir  = Q:\PRS\ACCOUNTS\TX\TELPAS\2018\Standard Setting\ForRA;
%let datname  = sumstats_com_level;
%let xls_dir  = C:\Program Files\Microsoft Office\root\Office16\EXCEL.EXE;
%let file_dir = C:\Users\uzhanou\Documents\Standard Setting\TELPAS\tech report;
%let filename = Recommended_Cut_Score_Summary_Statistics;
%let vlist    = int ad1 ad2;
/*(r2c3:r19c5)*/
%let r1       = 2 ;
%let c1       = 3 ;
%let r2       = 19;
%let c2       = 5 ;

/* Apply macros */
%paste_tbl(&dat_dir, &file_dir, &xls_dir, &filename, &datname, &sub, &grade, &vlist, &r1., &c1., &r2., &c2. );
```

SAS Macros & Demo (cont.)

Macro 4: Apply to multiple subjects and grade bands (apply macro 3)

```
/** --- Example 2: Multi- subject + grade --- **/
/* set up subject and grade */
%let subj  = R|L|S;                /* R-reading, L-listening, S-Speaking*/
%let grade = 2/3/45/67/89/1012|    /* Grade,gradeband for each subject/domain separated by "|" */
             23/45/68/912|
             23/45/68/912;

%let dat_dir  = Q:\PRS\ACCOUNTS\TX\TELPAS\2018\Standard Setting\ForRA;
%let datname  = sumstats_com_level;
%let xls_dir  = C:\Program Files\Microsoft Office\root\Office16\EXCEL.EXE;
%let file_dir = C:\Users\uzhanou\Documents\Standard Setting\TELPAS\tech report;
%let filename = Recommended_Cut_Score_Summary_Statistics;
%let vlist    = int ad1 ad2;

/*(r2c3:r19c5)*/
%let r1       = 2 ;
%let c1       = 3 ;
%let r2       = 19;
%let c2       = 5 ;

/* Apply the final macro */
%multi_table(&dat_dir, &file_dir, &xls_dir, &filename, &datname, &subj, &grade, &vlist, &r1, &c1, &r2, &c2);
```

SAS Macros & Demo (cont.)

DEMO

Easter Egg

- Did you know you can run VBA macros from SAS?

```
/** ------------------  Easter Egg Section ----------------------  **/
/* EGG STEP 1: Turn on EXCEL */
options noxwait noxsync;
x '"C:\Program Files\Microsoft Office\root\Office16\EXCEL.EXE" ';

/* Sleep for 5 seconds to give Excel time to come up */
data _null_;
    x=sleep(5);
run;

/* EGG STEP 2: Use SAS to Run VBA macro on a Excel Macro-Enabled Workbook */
filename cmds dde 'excel|system';
data _null_;
    file cmds;

    /* Open the excel file test.xlsm which contains the VBA macro */
    put '[open("C:\Users\uzhanou\Documents\2018 Conference\Internal\enrichment\DDE+VBA\example\test.xlsm")]';

    /* Run copy macro in the test.xlsm to duplicate formatted tabs */
    put '[run("test.xlsm!copy")]';
run;
```

Takeaways

- VBA Macro is not difficult to understand and can be used in a good way
- DDE is powerful and doesn’t change table format at all
- VBA + DDE can make our table mass-production a little easier

Acknowledgement

- Special thanks of gratitude to my colleagues Kuzey Bilir, Shannon Wilder for their suggestion and advice to this presentation!

Q & A

Thank you!

Questions?

Slides + Code:

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ALWAYS LEARNING