SAS® to Excel:
Give Them the Report Exactly the Way That They Want It

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What is the commonest fate of SAS-prepared data?

Notice

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A Popular Solution around the World?

Nearly every week, I get a request from somewhere around the world for my free DDE toolkit of macros, sample programs, & supporting files.

You can request it via email.

What Can You Do with DDE?

- Anything you can do with keyboard & mouse
- Here I cover only a subset of the input/output & formatting capabilities
- When DDE cannot do it (rare), pre-record an Excel macro & run it with DDE

What You Can Do without DDE:
See my MWSUG 2010 paper
“SAS and Excel,
A Winning Combination, Part 1”

Scope of Presentation

- As much as time permits
- 53-page paper covers everything

If you use SAS on a Server, not on your desktop or laptop PC

- Feasible (I have done it), but . . .

  Important Cautions Apply

- See Appendix 1 in the paper for details.
- In 2009, I published a non-DDE tool to handle the situations that can arise. See Appendix 1 for the reference.

If you use SAS
on your desktop or laptop PC,
you can have
a very cool experience:
In one window, watch SAS log
In other window, watch Excel

Presentation Content & Style

- Much code
- Spreadsheet Results, step by step
- Numerous slides, plus more, if time permits
- Very little here on read/write to/from Excel
  (well covered by other authors, and
  in SAS Companion to Windows)

Companion Material

- Paper
- Available via email: more programs than can be covered here, PLUS 60 macros, plus a SAS user solution for cell merge
- Programs substantially commented

Presentation Plan

- In-depth “How It Works”
- Basic Examples: usable for any application

As/If Time Permits

- Special Applications

DDE: Dynamic Data Exchange

- Your SAS session is a client
- It opens Excel which acts as a server

Your SAS Program:

1. Starts/Executes Excel
2. Establishes channel to talk to Excel
3. Opens new/existing XLS file (workbook)
4. Sends commands to Excel
5. Saves, or Saves As (new/diff), XLS file
6. Exits/Stops Excel

Formatting the Cells

- Font controls:

  font, style, size, color*, underline

- Color the background*

*Colored text harder to read

than black on white:

extreme example Example at left occurred!

Beware of effect of

text color / background color combinations

on readability

More Formatting for the Cells

- Cell sizing, including:
  - column or row AutoFit
  - column or row Hide/Unhide
- Alignment / Wrap
- Borders (e.g., section the worksheet)
- Indent content (two tricks shown with sample programs/macros)

Worksheet Controls

- Select worksheet, cells, rows, columns
- Freeze/Unfreeze Panes
- Turn AutoFilter On/Off
- Generate subtotals in Worksheet
- Control/Change levels for Excel subtotals
- Or use multiple sheets for levels of totals
- Activate specific worksheet in workbook
- Create additional worksheets in workbook
- Delete unused worksheets in workbook

Other Manipulation

- Insert/Delete columns or rows
- Find
- Find and Replace cell contents
- Copy cells
- Move cells
- Use formulas to create new column(s)

Miscellaneous

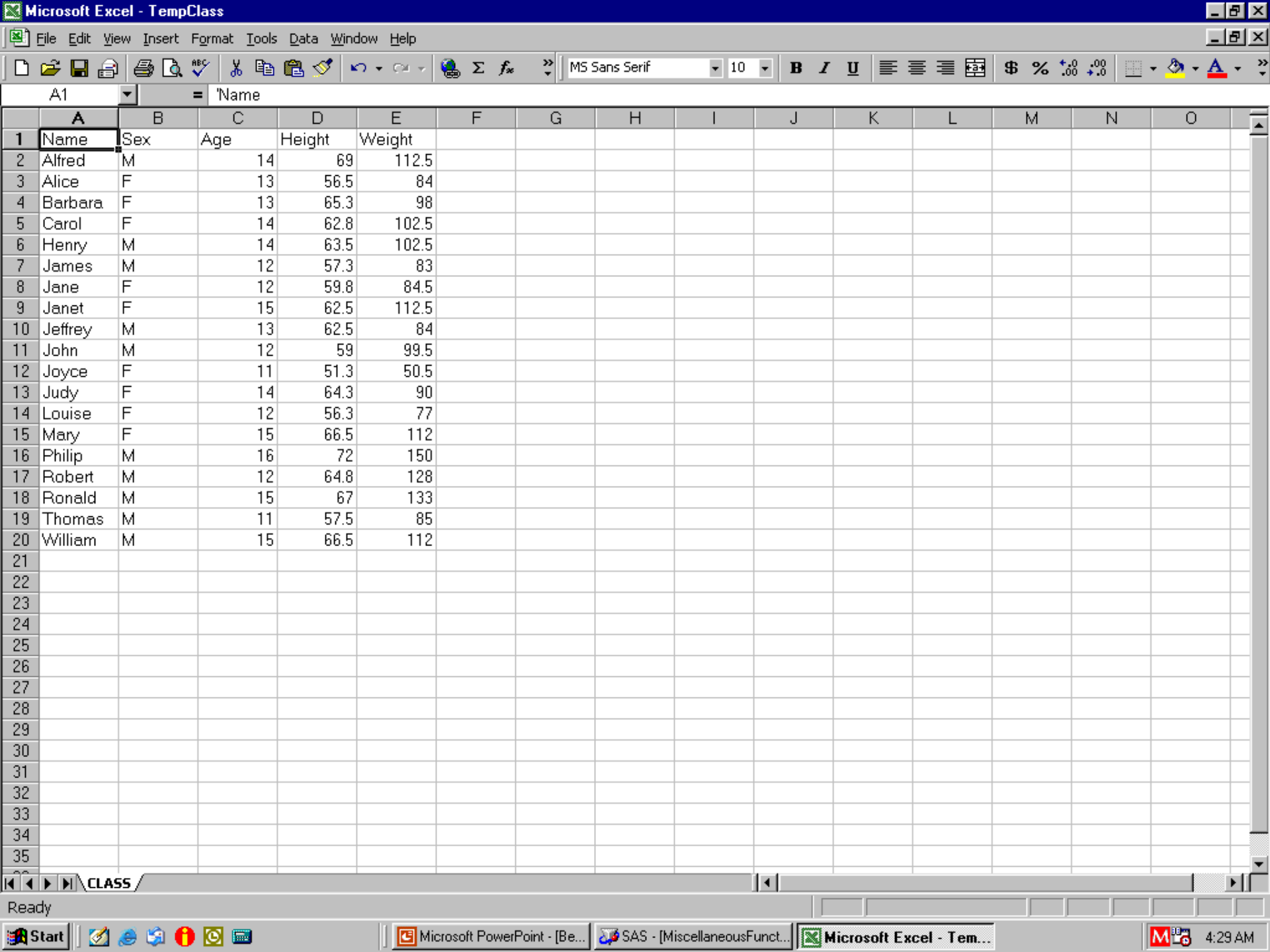
- Zoom –

  to shrink (or enlarge) worksheet
- Message –

  but might get overlooked by viewer

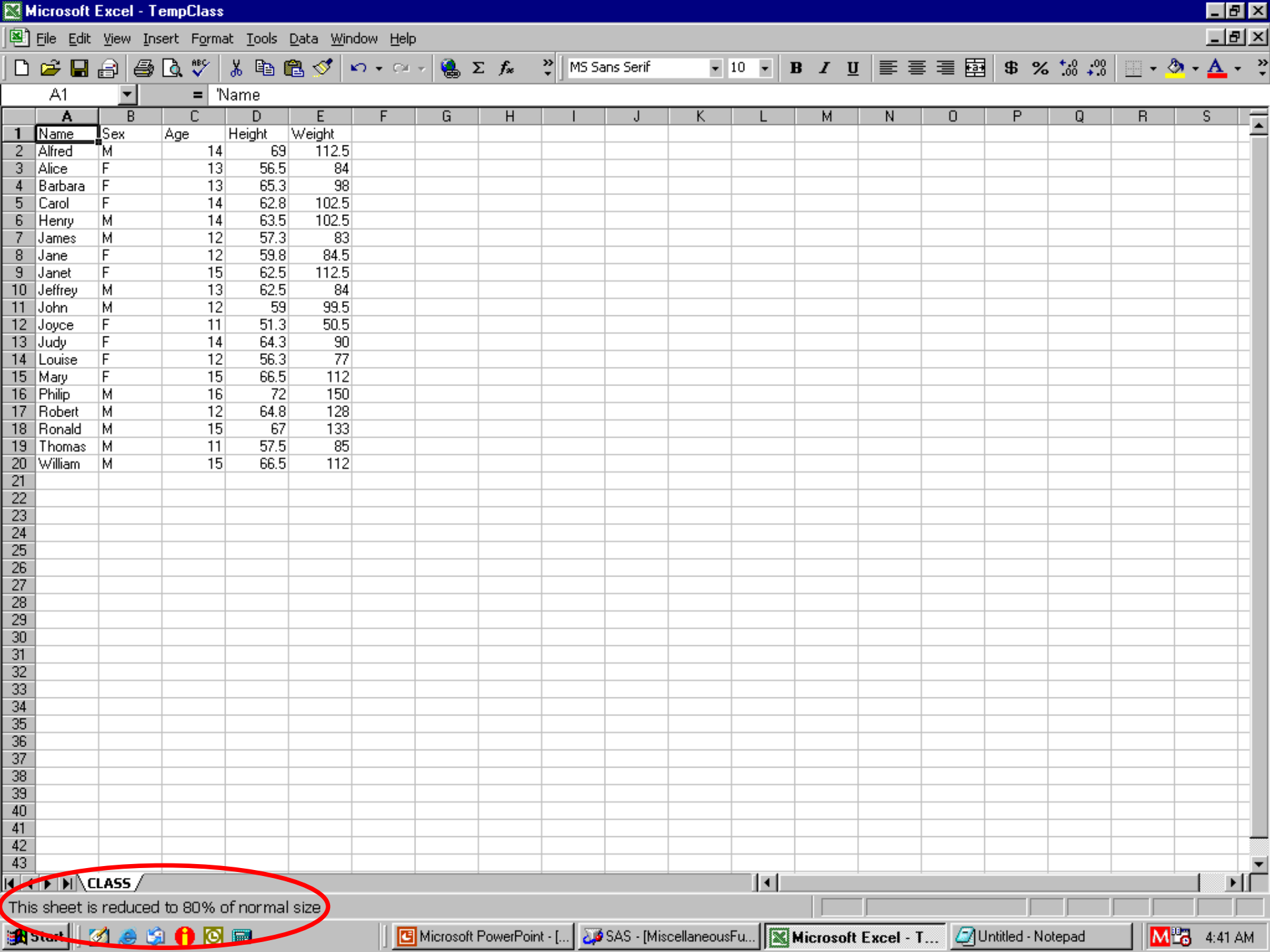
Our First Example . . .

- demonstrate concept
- actual use improbable
- chosen for its simplicity to do & show results


Microsoft Excel - TempClass
File Edit View Insert Format Tools Data Window Help
MS Sans Serif
10
A1
'Name
Name Sex Age Height Weight
Alfred M 14 69 112.5
Alice F 13 56.5 84
Barbara F 13 65.3 98
Carol F 14 62.8 102.5
Henry M 14 63.5 102.5
James M 12 57.3 83
Jane F 12 59.8 84.5
Janet F 15 62.5 112.5
Jeffrey M 13 62.5 84
John M 12 59 99.5
Joyce F 11 51.3 50.5
Judy F 14 64.3 90
Louise F 12 56.3 77
Mary F 15 66.5 112
Philip M 16 72 150
Robert M 12 64.8 128
Ronald M 15 67 133
Thomas M 11 57.5 85
William M 15 66.5 112
CLASS
Ready
Start
Microsoft PowerPoint - [Be...
SAS - [MiscellaneousFunct...
Microsoft Excel - Tem...
4:29 AM

Shrink Cell/WorkSheet Size
Put Message in Lower Left Corner

```
data _null_;
file DDEcmds;
put '[zoom(80)]';
put '[message(true,
"This Sheet reduced to 80% of normal size")]';
run;
```


Microsoft Excel - TempClass
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MS Sans Serif
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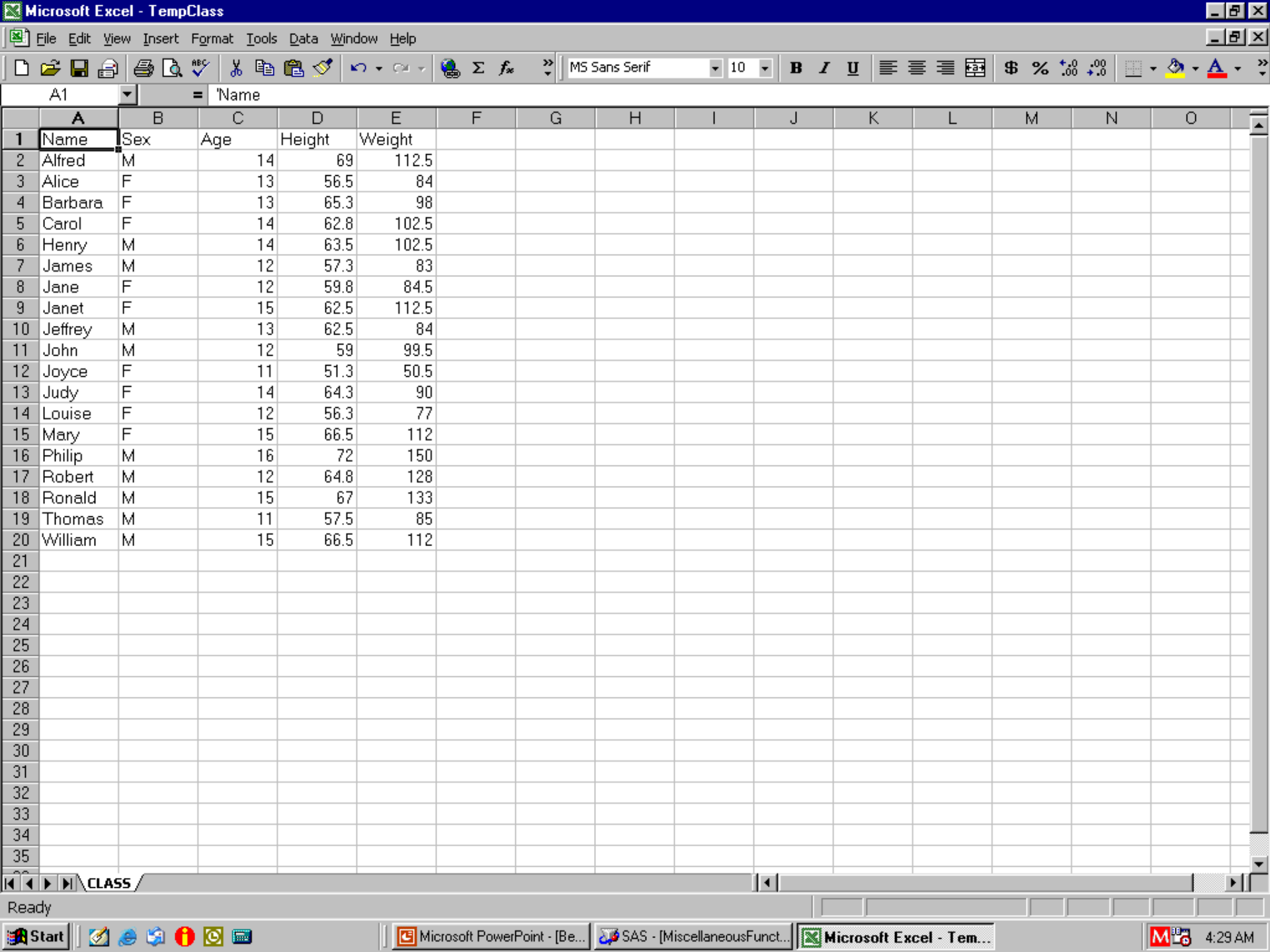
Louise F 12 56.3 77
Mary F 15 66.5 112
Philip M 16 72 150
Robert M 12 64.8 128
Ronald M 15 67 133
Thomas M 11 57.5 85
William M 15 66.5 112
CLASS
This sheet is reduced to 80% of normal size
Start
Microsoft PowerPoint - [...
SAS - [MiscellaneousFu...
Microsoft Excel - T...
Untitled - Notepad
4:41 AM

Restore Cell/WorkSheet Size
Restore Default Message (Ready)

```
data _null_;
file DDEcmds;
put '[zoom(100)]';
put '[message(false)]';
run;
```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Joyce F 11 51.3 50.5
Judy F 14 64.3 90
Louise F 12 56.3 77
Mary F 15 66.5 112
Philip M 16 72 150
Robert M 12 64.8 128
Ronald M 15 67 133
Thomas M 11 57.5 85
William M 15 66.5 112
CLASS
Ready
Start
Microsoft PowerPoint - [Be...
SAS - [MiscellaneousFunct...
Microsoft Excel - Tem...
4:29 AM

Channel for DDE Commands

- Special SAS filename statement
- filename YourFileRef dde “excel|system”;
- YourFileRef is arbitrary 1-to-8 characters
- I like DDEcmds
- but can be anything

The DDE triplet for Excel

Identifies current selection for read or write:

EXCEL|YourSheet**!**RppppppCqqq**:**RssssssCttt

ppppp is 1-to-5-digit start/top row number

qqq is 1-to-3-digit start/left column number

sssss is end/bottom row number

ttt is end/right column number

row/column numbers with leading zeros OK

DDE doublets & singlets

Identify current selection for other XL action:

RppppCqqq:RssssCttt rectangle of cells

RppppCqqq single cell

Rpppp:Rssss range of rows

Rpppp single row

Cqqq:Cttt range of columns

Cqqq single column

Coding the DDE Triplet, etc.

EXCEL|YourSheet**!**RpppppCqqq**:**RssssCttt

- Not required to code it by hand
- When needed, Software Intelligence (SI) in your program can dynamically determine number of rows or ending row required, etc.

Coding DDE Triplets, etc.

EXCEL|YourSheet!RpppppCqqq:RssssCttt

Can Be:

- Explicitly coded
- SAS-macro-generated
- Software-Intelligence generated

SAS-to-Excel DDE Commands

- Originally Developed by Microsoft for earlier editions(s) of Excel
- I have used them with various versions of Windows and Excel (including 2007)
- They work for me, but NO GUARANTEES

SAS-to-Excel DDE Commands

- Documented in Macrofun.hlp
- Download it from Microsoft:

  Use Google to search for Macrofun.hlp
- Macrofun = “Macro Functions” (but can be fun)
- Functions do not require

  use of custom Excel macros created by you

SAS-to-Excel DDE Commands

Caveats:

- Not every command works (e.g., rename worksheets, create subtotals, . . .)
- Some command *options* may not work
- What *does* work is an enormous tool set!

true / false values for DDE cmds

To turn options On / Off
via DDE command parameter assignment,
use true / false

But for some commands,
use 1 / 0 instead

DDE Command Format

put '[CommandName(arg1,arg2,…,argN)]';

- CommandName
  may be multi-word, dot-separated
- To indicate omission of arguments—
  if at start of list: ,arg2,arg3, …
  if in middle of list: arg1,,arg3, …
  if at end of list: arg1,arg2 (just omit it)

The DDE Framework

- Start Excel

  (provides default empty workbook, 3 sheets)
- Optionally, open an existing workbook
- Application processing
- Save / Save As of current workbook
- Exit Excel

Starting Excel from SAS

For other versions of MS Office or Excel,
the folder sequence below may differ:

```
x '"C:\Program Files\Microsoft Office\Office\EXCEL.exe"';
data _null_;
z=sleep(3); /* wait 3 seconds for Excel to start */
run;
```

Opens a new workbook,
with three empty worksheets:
Sheet1, Sheet2, Sheet3

Open Existing Workbook from SAS

```
data _null_;  /* talk to DDE, no output data */
file DDEcmds;
put '[open(
       "c:\YourFolder\YourWorkbook.xls")]';
z=sleep(3);  /* wait 3 seconds for it to open */
run;              /* it is important to wait before
                     sending next DDE command */
```

Finished Workbook Save As

```
data _null_;
file DDEcmds;
put '[error(false)]';
put '[save.as
        ("c:\OtherFolder\DifferentFileName.xls")]';
z=sleep(1);
run;
```

error(false) command tells Excel that you do not want any prompts to confirm intention

Exiting Excel from SAS

```
data _null_;
file DDEcmds;
put '[error(false)]';
put '[quit()]';  /* empty parenthesis */
run;
```

error(false) command tells Excel that you do not want any prompts to confirm intention

doing it all with macros is easier

```
%XLStart;
%XLDDEcmdsFileName;
%XLOpen(WorkBook=
        c:\YourFolder\YourWorkbook.xls);
%XLSaveAs(WorkBook=
        c:\OtherFolder\DifferentFileName.xls);
%XLExit;
```

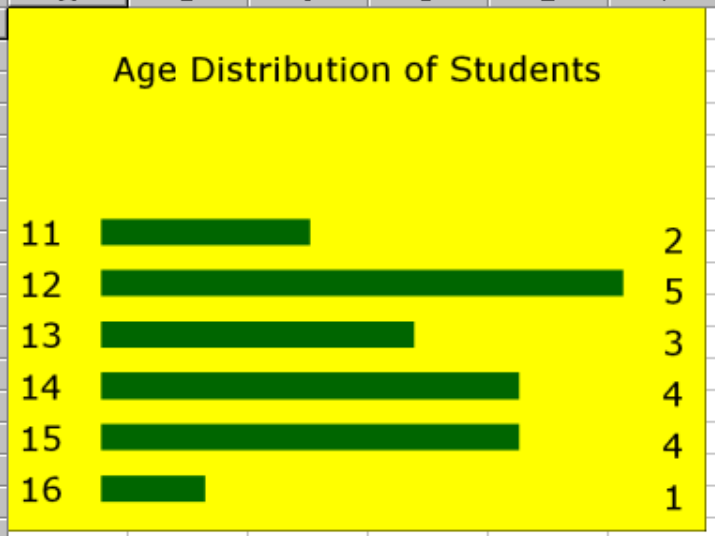
- Details out of scope of presentation
- Macros & sample programs available by email

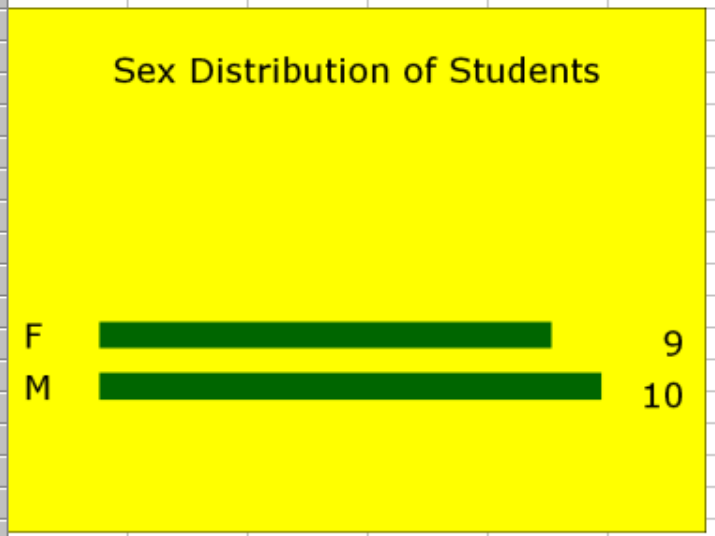
Graphs + Table in Worksheet

Microsoft Excel - SimpleComposite.xls

File Edit View Insert Format Tools Data Window Help

A1





	Name	Age	Sex
2	Alfred	14	M
3	Alice	13	F
4	Barbara	13	F
5	Carol	14	F
6	Henry	14	M
7	James	12	M
8	Jane	12	F
9	Janet	15	F
10	Jeffrey	13	M
11	John	12	M
12	Joyce	11	F
13	Judy	14	F
14	Louise	12	F
15	Mary	15	F
16	Philip	16	M
17	Robert	12	M
18	Ronald	15	M
19	Thomas	11	M
20	William	15	M

Sheet2

Ready

Usual Start

```
OPTIONS NOXWAIT NOXSYNC;

x '"C:\Program Files\Microsoft Office\Office\EXCEL.exe"';
data _null_;
z=sleep(3);
run;

filename YourFileRef dde “excel|system”;
```

insert table labels

```
FILENAME labels DDE
                    'EXCEL|Sheet2!R1C7:R1C9';
DATA _NULL_;
FILE labels;
LABEL1 = 'Name';
LABEL2 = 'Age';
LABEL3 = 'Sex';
PUT LABEL1 LABEL2 LABEL3;
RUN;
```

load the data

```
FILENAME tbldata DDE
                    'EXCEL|Sheet2!R2C7:R20C9';
DATA _NULL_;
FILE tbldata;
SET sashelp.class;
PUT Name Age Sex;
RUN;
```

Not Shown Here

Use SAS/GRAPH to create two bar charts, image1.gif and image2.gif

insert & size first graph

```
DATA _NULL_;
FILE ddecmds;
PUT '[WORKBOOK.ACTIVATE("Sheet2")]';
PUT '[SELECT("R1C1")]';
PUT
   '[INSERT.PICTURE("C:\VIEWS\image1.gif")]';
PUT '[FORMAT.SIZE(280,210)]';
        /* default size IS 600,450 */
```

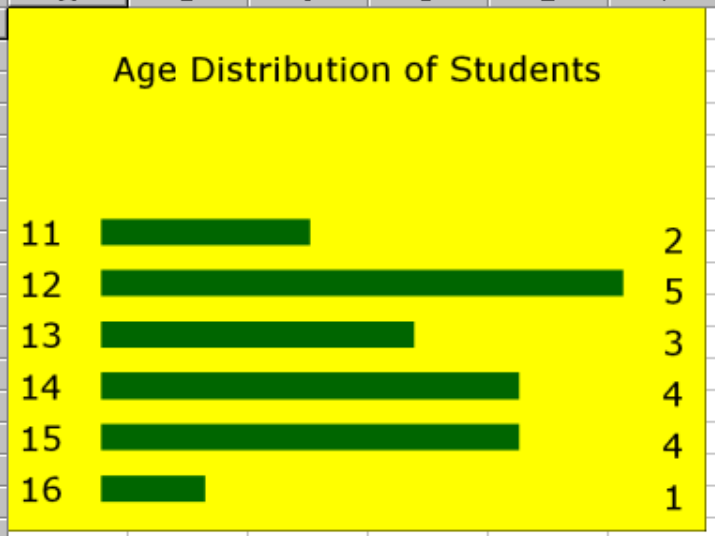
insert & size second graph

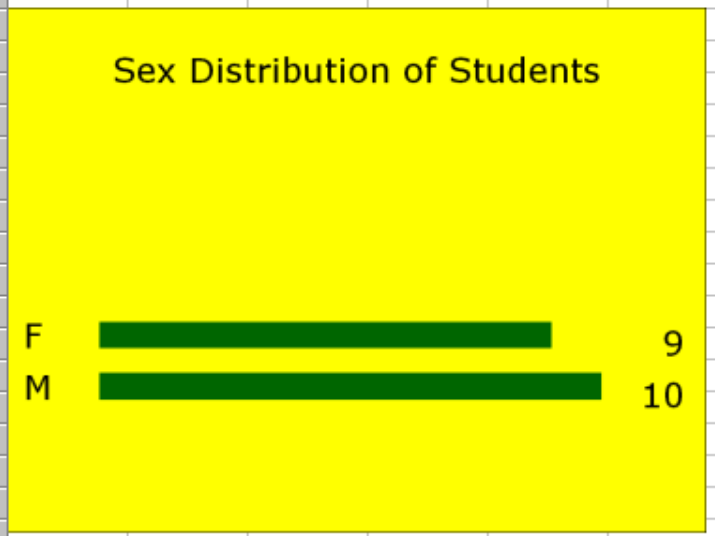
```
PUT '[SELECT("R18C1")]';
PUT
   '[INSERT.PICTURE("C:\VIEWS\image2.gif")]';
PUT '[FORMAT.SIZE(280,210)]';
PUT '[SELECT("R1C1")]';
RUN;
```

Microsoft Excel - SimpleComposite.xls

File Edit View Insert Format Tools Data Window Help

A1





	Name	Age	Sex
2	Alfred	14	M
3	Alice	13	F
4	Barbara	13	F
5	Carol	14	F
6	Henry	14	M
7	James	12	M
8	Jane	12	F
9	Janet	15	F
10	Jeffrey	13	M
11	John	12	M
12	Joyce	11	F
13	Judy	14	F
14	Louise	12	F
15	Mary	15	F
16	Philip	16	M
17	Robert	12	M
18	Ronald	15	M
19	Thomas	11	M
20	William	15	M

Sheet2

Ready

The Table Can Be Improved
using the methods you learn today

Code to create the result on the next slide,
featuring an improved table,
was published in VIEWS News Issue 40.

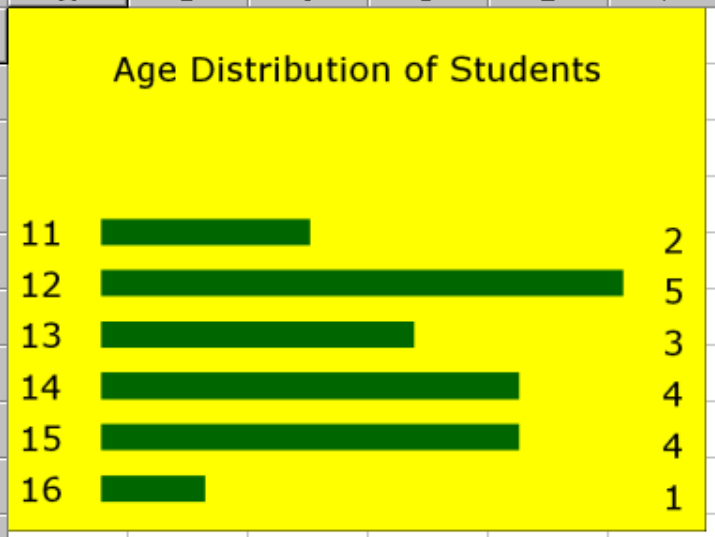
Please find with web search,
or request URL via email to me.

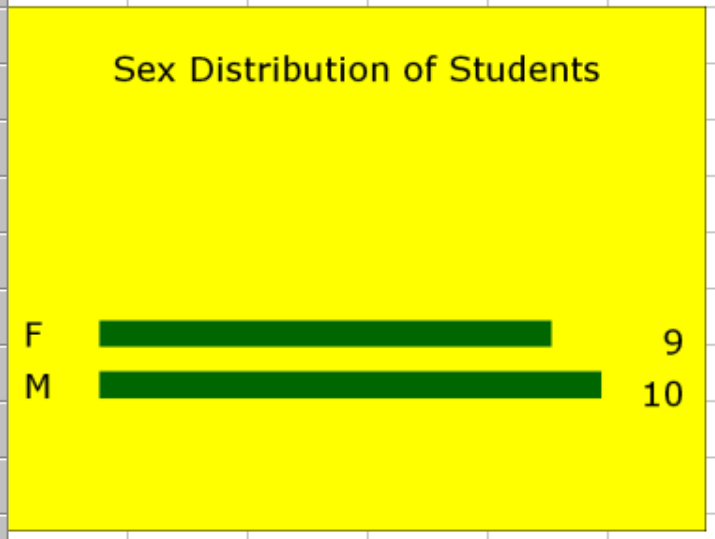
Microsoft Excel - CustomComposite.xls

File Edit View Insert Format Tools Data Window Help

Arial 10

A1 =





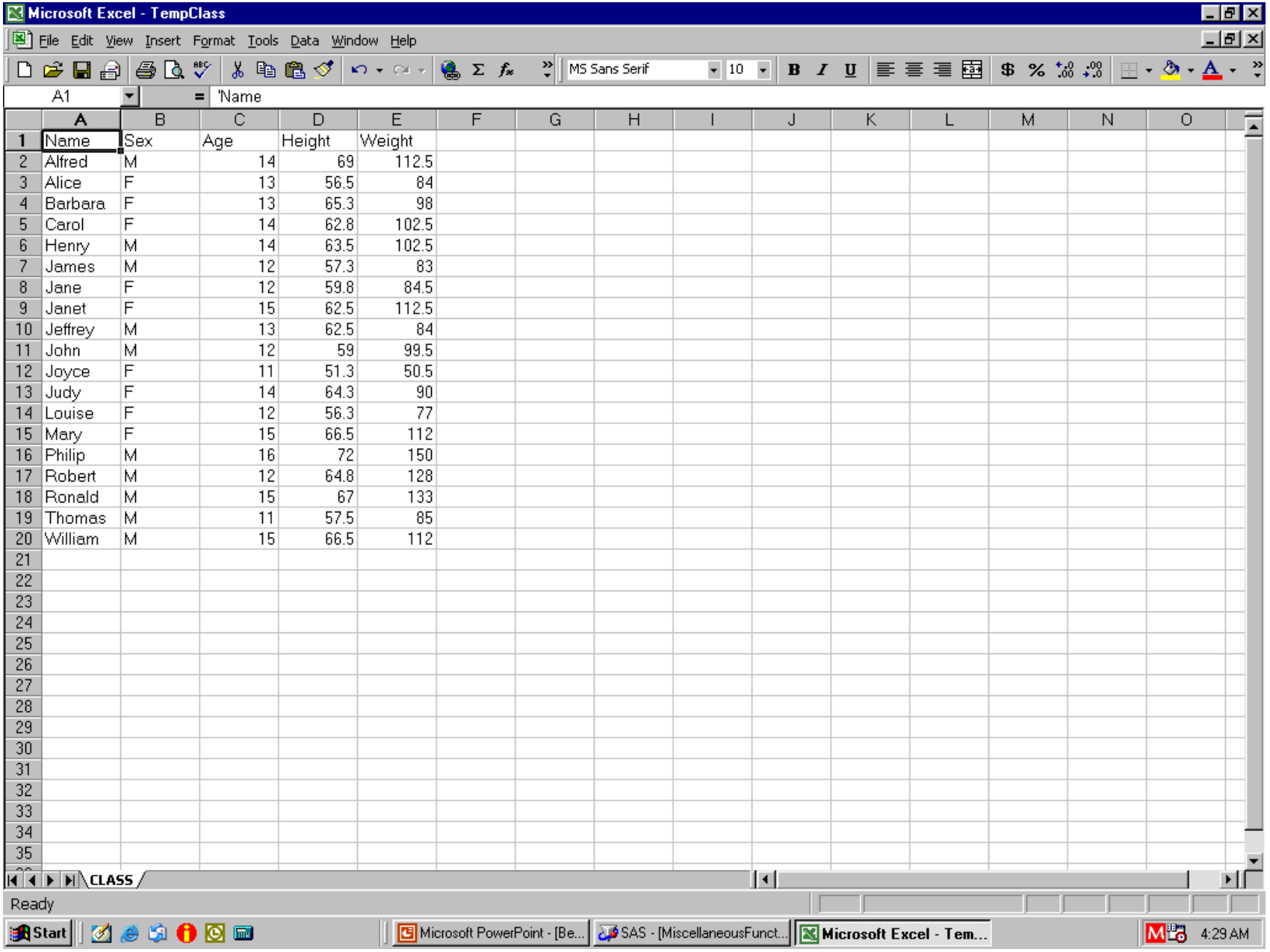
Name	Age	Sex
Alfred	14	M
Alice	13	F
Barbara	13	F
Carol	14	F
Henry	14	M
James	12	M
Jane	12	F
Janet	15	F
Jeffrey	13	M
John	12	M
Joyce	11	F
Judy	14	F
Louise	12	F
Mary	15	F
Philip	16	M
Robert	12	M
Ronald	15	M
Thomas	11	M
William	15	M

Sheet2

Ready

Fonts & Colors for Data in Cells

WorkSheet with Default Format



	A	B	C	D	E
1	Name	Sex	Age	Height	Weight
2	Alfred	M	14	69	112.5
3	Alice	F	13	56.5	84
4	Barbara	F	13	65.3	98
5	Carol	F	14	62.8	102.5
6	Henry	M	14	63.5	102.5
7	James	M	12	57.3	83
8	Jane	F	12	59.8	84.5
9	Janet	F	15	62.5	112.5
10	Jeffrey	M	13	62.5	84
11	John	M	12	59	99.5
12	Joyce	F	11	51.3	50.5
13	Judy	F	14	64.3	90
14	Louise	F	12	56.3	77
15	Mary	F	15	66.5	112
16	Philip	M	16	72	150
17	Robert	M	12	64.8	128
18	Ronald	M	15	67	133
19	Thomas	M	11	57.5	85
20	William	M	15	66.5	112

Font Formatting – Step 1

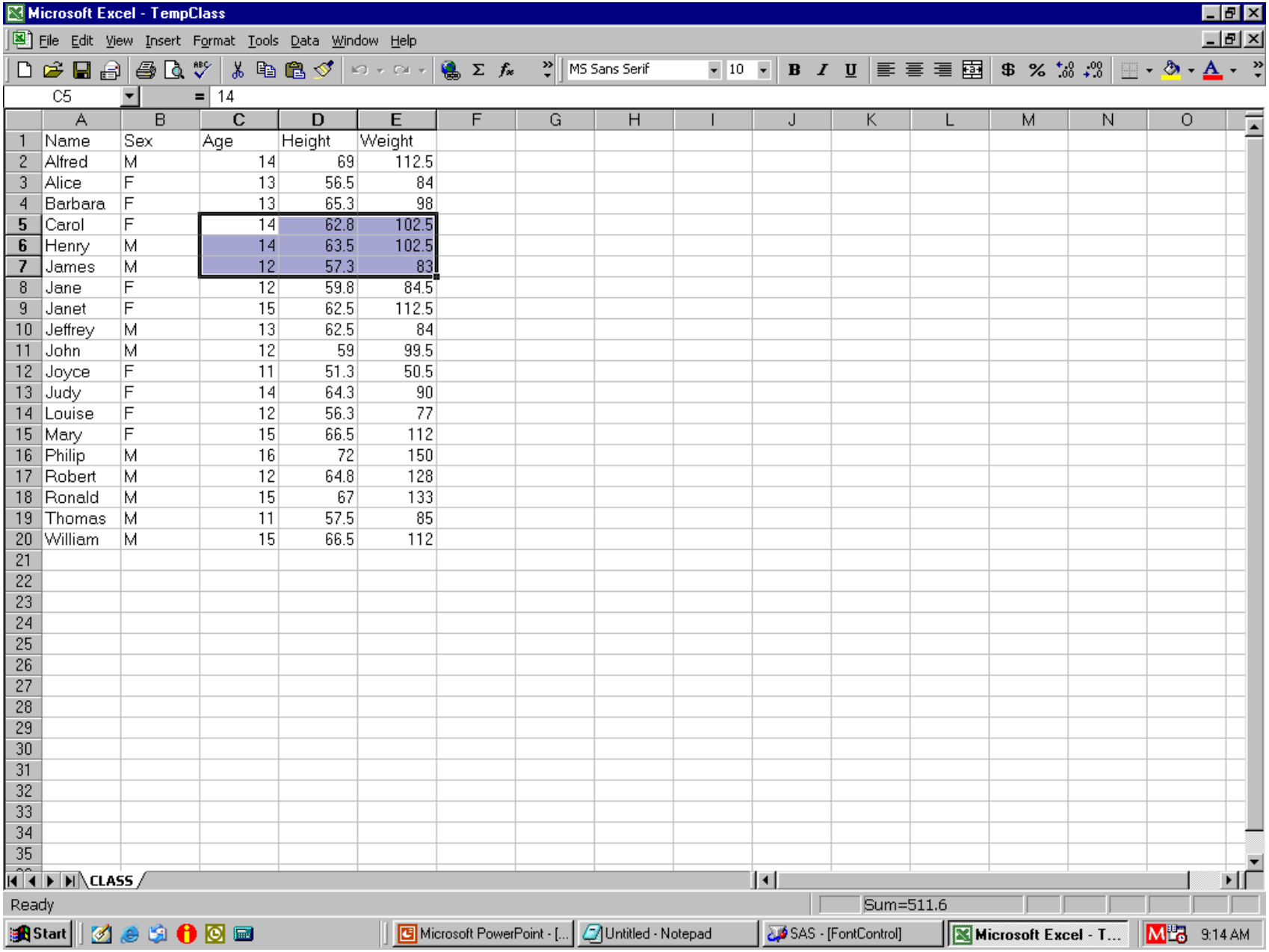
- Activate worksheet (if not already there)

  Not really necessary—

  this workbook has only one worksheet
- Select the cells to be formatted

```
data _null_;
file DDEcmds;
put '[workbook.activate("CLASS")]';
put '[select("R5C3:R7C5")]‘;
run;
```

Select Cells To Be Formatted



	A	B	C	D	E
1	Name	Sex	Age	Height	Weight
2	Alfred	M	14	69	112.5
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16	Philip	M	16	72	150
17	Robert	M	12	64.8	128
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19	Thomas	M	11	57.5	85
20	William	M	15	66.5	112

Font Formatting – Step 2

We want:

font Verdana

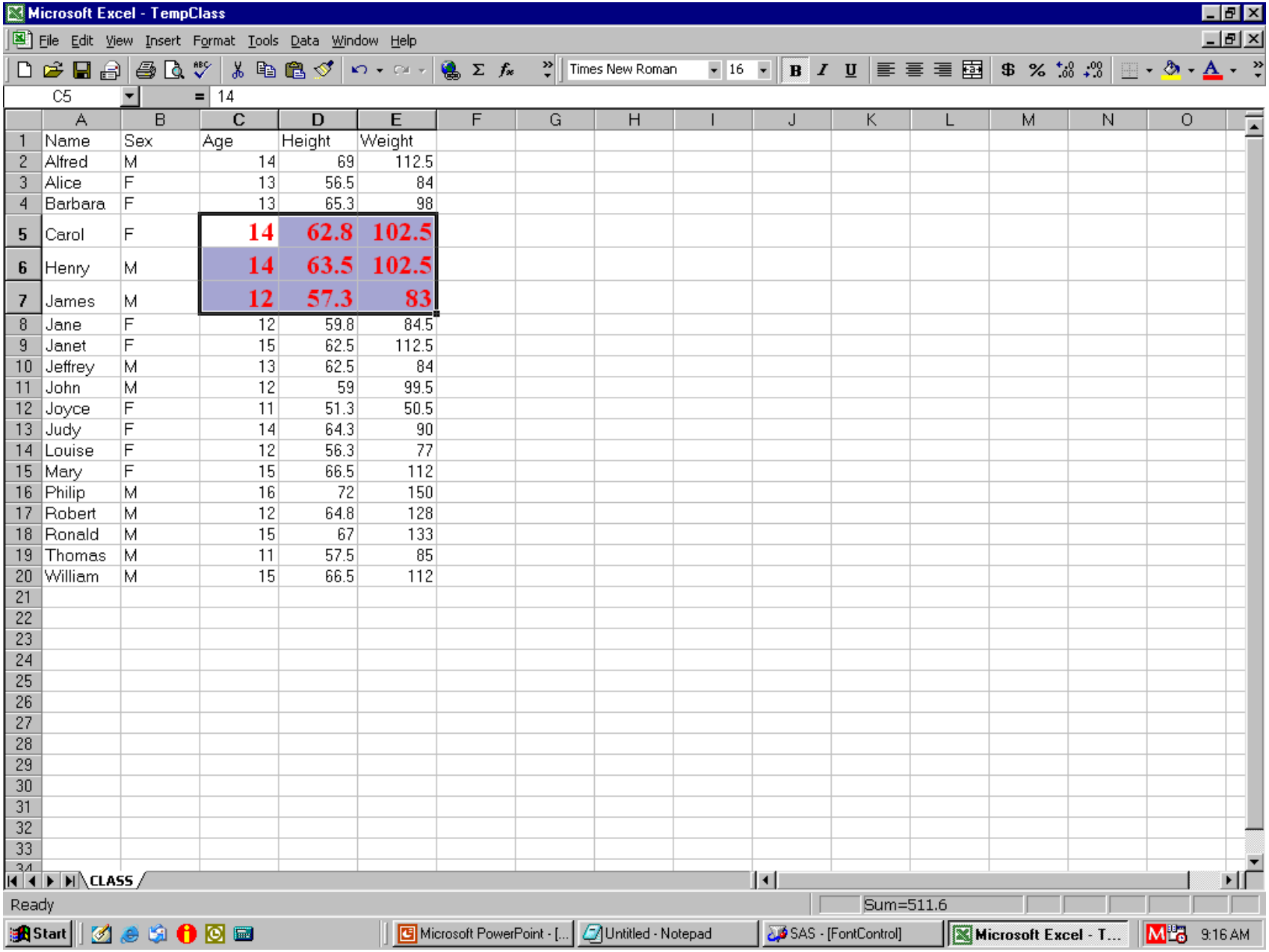
style Bold

size 16 point

(Excel) color 3

```
data _null_;
file DDEcmds;
put '[font.properties("Verdana","Bold",16,,,,,,,3)]';
run;
```

Font Changed, but Obscured



	A	B	C	D	E
1	Name	Sex	Age	Height	Weight
2	Alfred	M	14	69	112.5
3	Alice	F	13	56.5	84
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15	Mary	F	15	66.5	112
16	Philip	M	16	72	150
17	Robert	M	12	64.8	128
18	Ronald	M	15	67	133
19	Thomas	M	11	57.5	85
20	William	M	15	66.5	112

Font Formatting – Step 3 for Demo

After block of cells formatted,

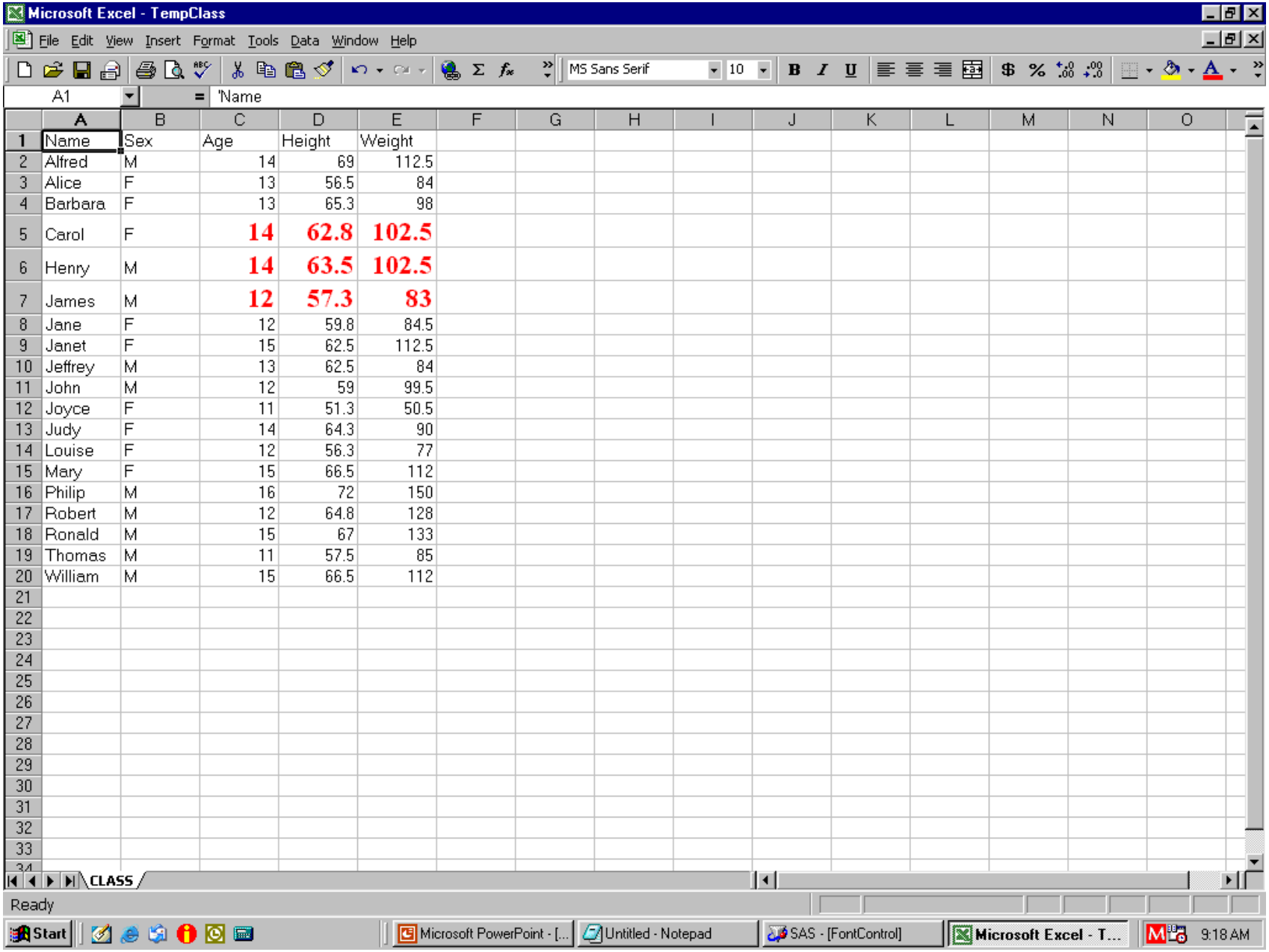
predecessor select("R5C3:R7C5") command leaves them highlighted.

But I want to see new color.

Move the focus:

```
data _null_;
file DDEcmds;
put '[select("R1C1")]';
run;
```

“I can see clearly now.”



	A	B	C	D	E
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4	Barbara	F	13	65.3	98
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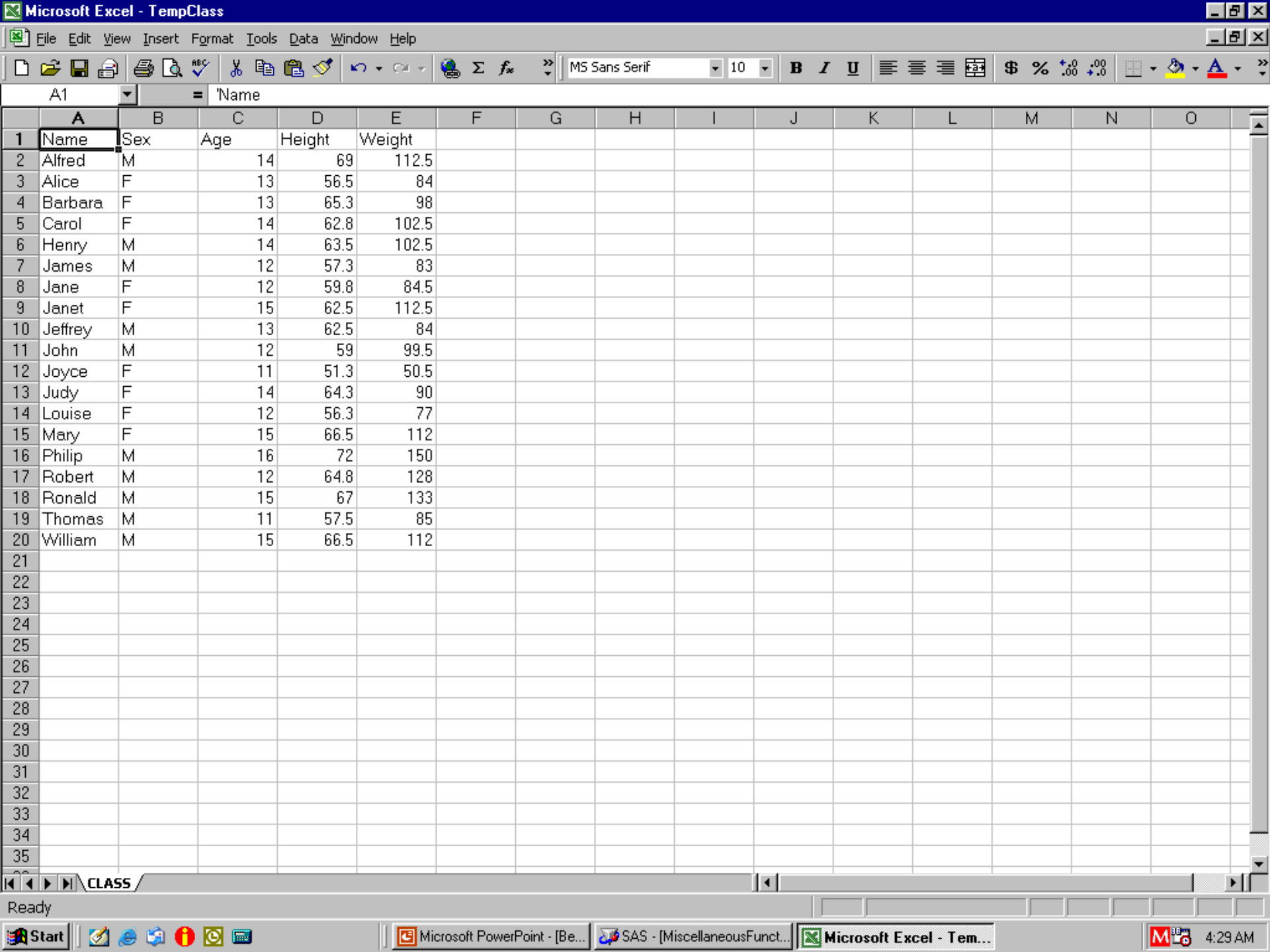
13	Judy	F	14	64.3	90
14	Louise	F	12	56.3	77
15	Mary	F	15	66.5	112
16	Philip	M	16	72	150
17	Robert	M	12	64.8	128
18	Ronald	M	15	67	133
19	Thomas	M	11	57.5	85
20	William	M	15	66.5	112

Font Formatting – All In One Step

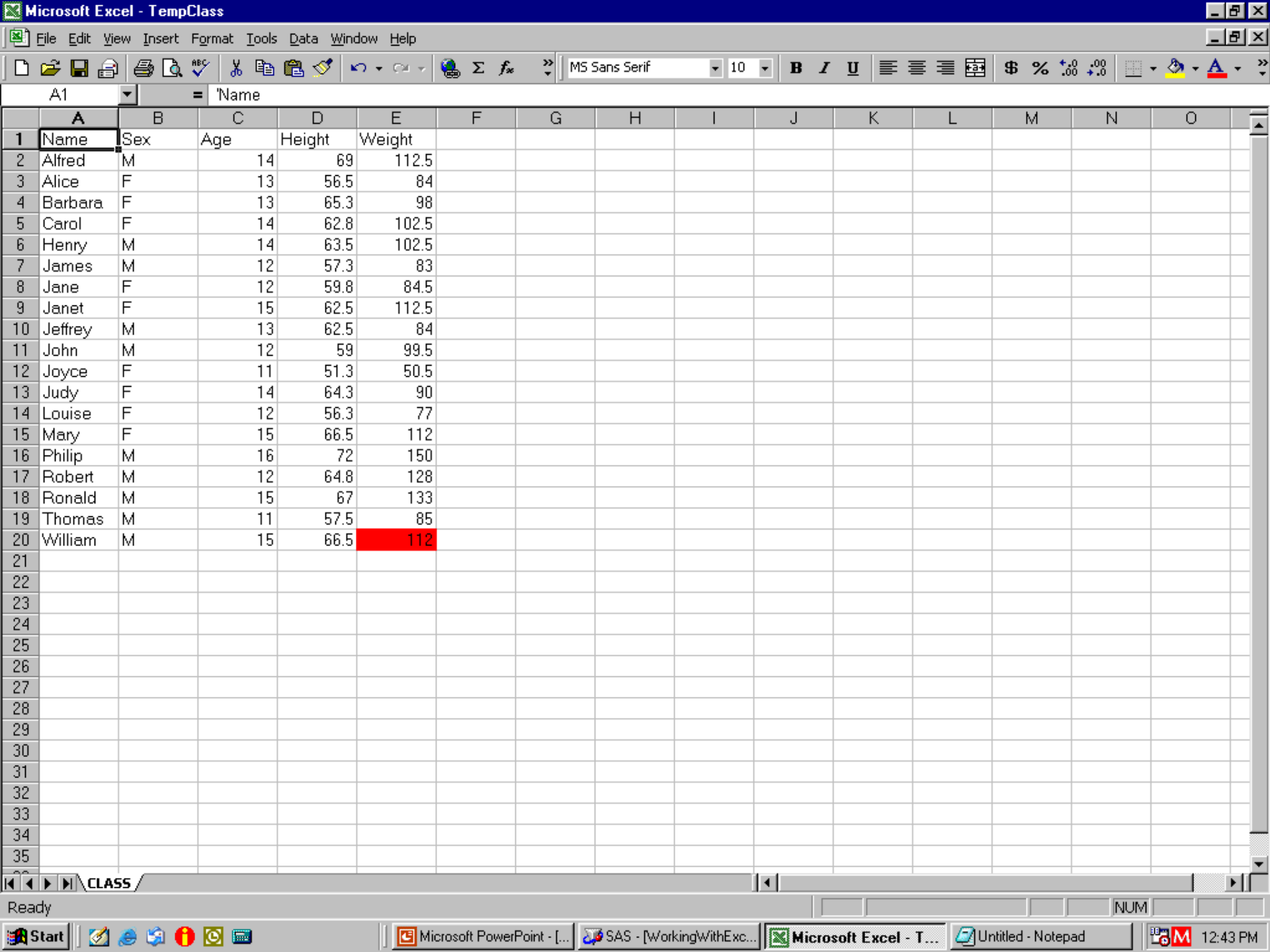
```
data _null_;
File DDEcmds;
put '[workbook.activate("Class")]';
put '[select("R5C3:R7C5")]‘;
put '[font.properties
        ("Verdana","Bold Italic",16,,,,,,,3)]';
put '[select("R1C1")]';
run;
```

Background Colors for Cells


Microsoft Excel - TempClass
File Edit View Insert Format Tools Data Window Help
MS Sans Serif
10
A1
'Name
Name Sex Age Height Weight
Alfred M 14 69 112.5
Alice F 13 56.5 84
Barbara F 13 65.3 98
Carol F 14 62.8 102.5
Henry M 14 63.5 102.5
James M 12 57.3 83
Jane F 12 59.8 84.5
Janet F 15 62.5 112.5
Jeffrey M 13 62.5 84
John M 12 59 99.5
Joyce F 11 51.3 50.5
Judy F 14 64.3 90
Louise F 12 56.3 77
Mary F 15 66.5 112
Philip M 16 72 150
Robert M 12 64.8 128
Ronald M 15 67 133
Thomas M 11 57.5 85
William M 15 66.5 112
CLASS
Ready
Start
Microsoft PowerPoint - [Be...
SAS - [MiscellaneousFunct...
Microsoft Excel - Tem...
4:29 AM

Color the Cell Background

```
data _null_;
file DDEcmds;
put '[select.special(11)]';
put '[patterns(1,,3,true)]';  /* 3 = red */
put '[select("R1C1")]';       /* move the focus */
run;
```



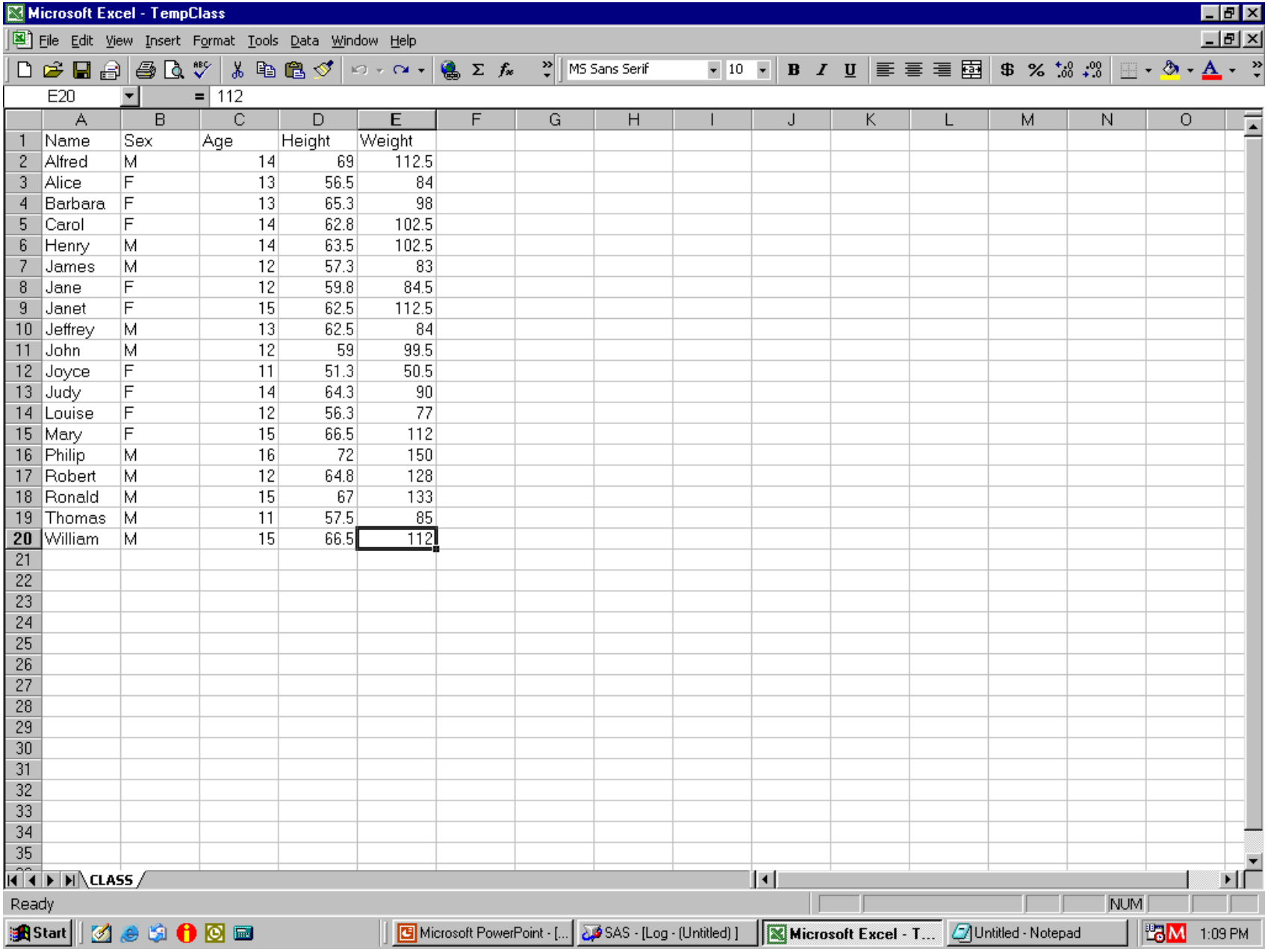
	A	B	C	D	E
1	Name	Sex	Age	Height	Weight
2	Alfred	M	14	69	112.5
3	Alice	F	13	56.5	84
4	Barbara	F	13	65.3	98
5	Carol	F	14	62.8	102.5
6	Henry	M	14	63.5	102.5
7	James	M	12	57.3	83
8	Jane	F	12	59.8	84.5
9	Janet	F	15	62.5	112.5
10	Jeffrey	M	13	62.5	84
11	John	M	12	59	99.5
12	Joyce	F	11	51.3	50.5
13	Judy	F	14	64.3	90
14	Louise	F	12	56.3	77
15	Mary	F	15	66.5	112
16	Philip	M	16	72	150
17	Robert	M	12	64.8	128
18	Ronald	M	15	67	133
19	Thomas	M	11	57.5	85
20	William	M	15	66.5	112

Remove the Background Color

```
data _null_;
file DDEcmds;
put '[undo()]';
run;

/* UNDO moves the focus
    from R1C1 back to the cell
    where the background color is undone,
    and leaves it there */
```

Color Undone, Cell Still Selected



	A	B	C	D	E
1	Name	Sex	Age	Height	Weight
2	Alfred	M	14	69	112.5
3	Alice	F	13	56.5	84
4	Barbara	F	13	65.3	98
5	Carol	F	14	62.8	102.5
6	Henry	M	14	63.5	102.5
7	James	M	12	57.3	83
8	Jane	F	12	59.8	84.5
9	Janet	F	15	62.5	112.5
10	Jeffrey	M	13	62.5	84
11	John	M	12	59	99.5
12	Joyce	F	11	51.3	50.5
13	Judy	F	14	64.3	90
14	Louise	F	12	56.3	77
15	Mary	F	15	66.5	112
16	Philip	M	16	72	150
17	Robert	M	12	64.8	128
18	Ronald	M	15	67	133
19	Thomas	M	11	57.5	85
20	William	M	15	66.5	112

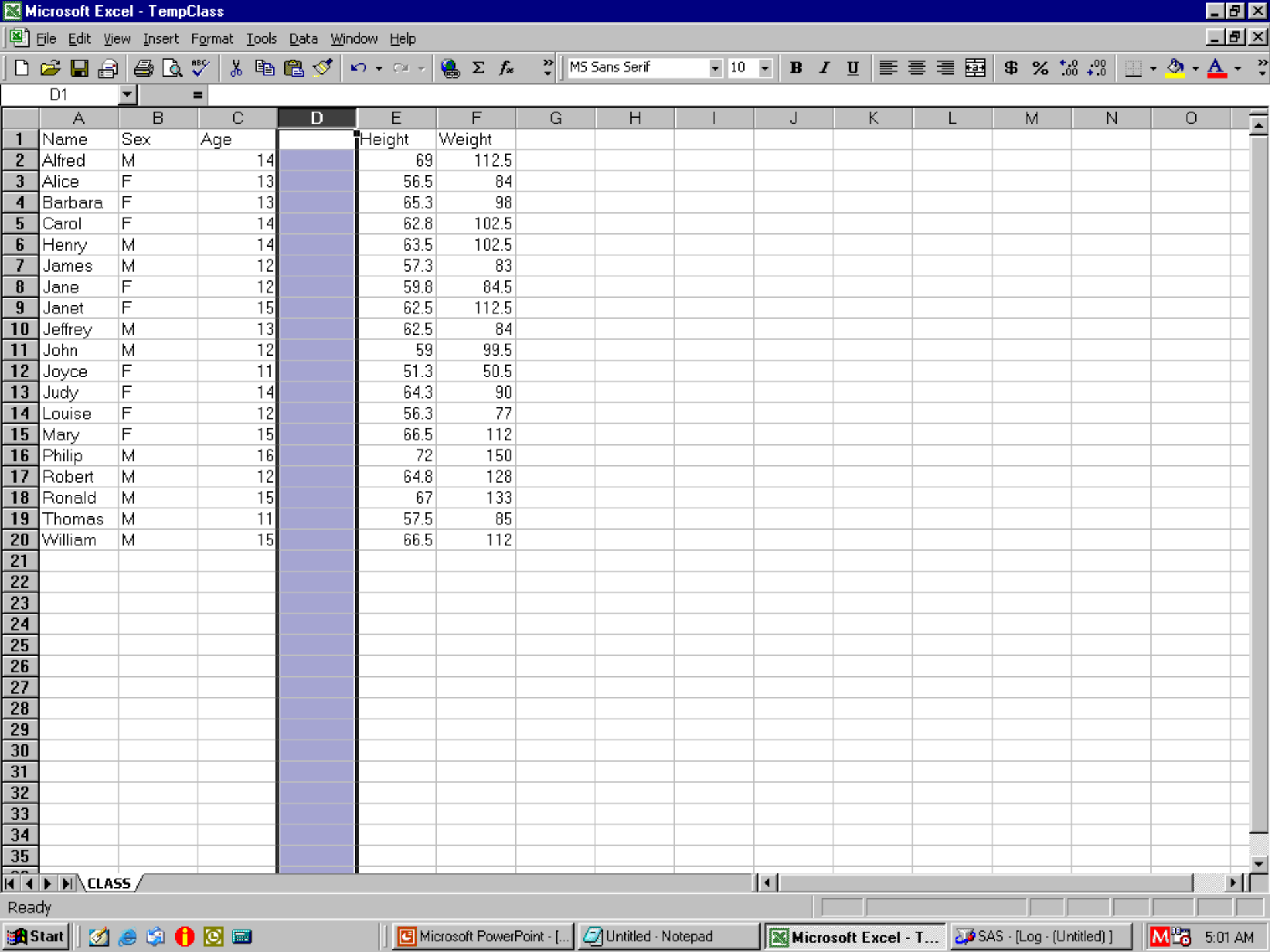
Using Formulas in Excel

Using Formulas in Excel

- Normally,
  could create data in SAS pre-load process
- Suppose, however, we want
  columns derived from Excel subtotals
- For demo only,
  working with simple spreadsheet content,
  without subtotals
- With subtotals present,
  use of Excel formulas works the same

Get New Column Left of Column 4

```
data _null_;
file DDEcmds;
put '[select("C4")]';
put '[insert(4)]'; /* 4 specifies type of INSERT */
run;
```



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	Name	Sex	Age		Height	Weight									
2	Alfred	M	14		69	112.5									
3	Alice	F	13		56.5	84									
4	Barbara	F	13		65.3	98									
5	Carol	F	14		62.8	102.5									
6	Henry	M	14		63.5	102.5									
7	James	M	12		57.3	83									
8	Jane	F	12		59.8	84.5									
9	Janet	F	15		62.5	112.5									
10	Jeffrey	M	13		62.5	84									
11	John	M	12		59	99.5									
12	Joyce	F	11		51.3	50.5									
13	Judy	F	14		64.3	90									
14	Louise	F	12		56.3	77									
15	Mary	F	15		66.5	112									
16	Philip	M	16		72	150									
17	Robert	M	12		64.8	128									
18	Ronald	M	15		67	133									
19	Thomas	M	11		57.5	85									
20	William	M	15		66.5	112									
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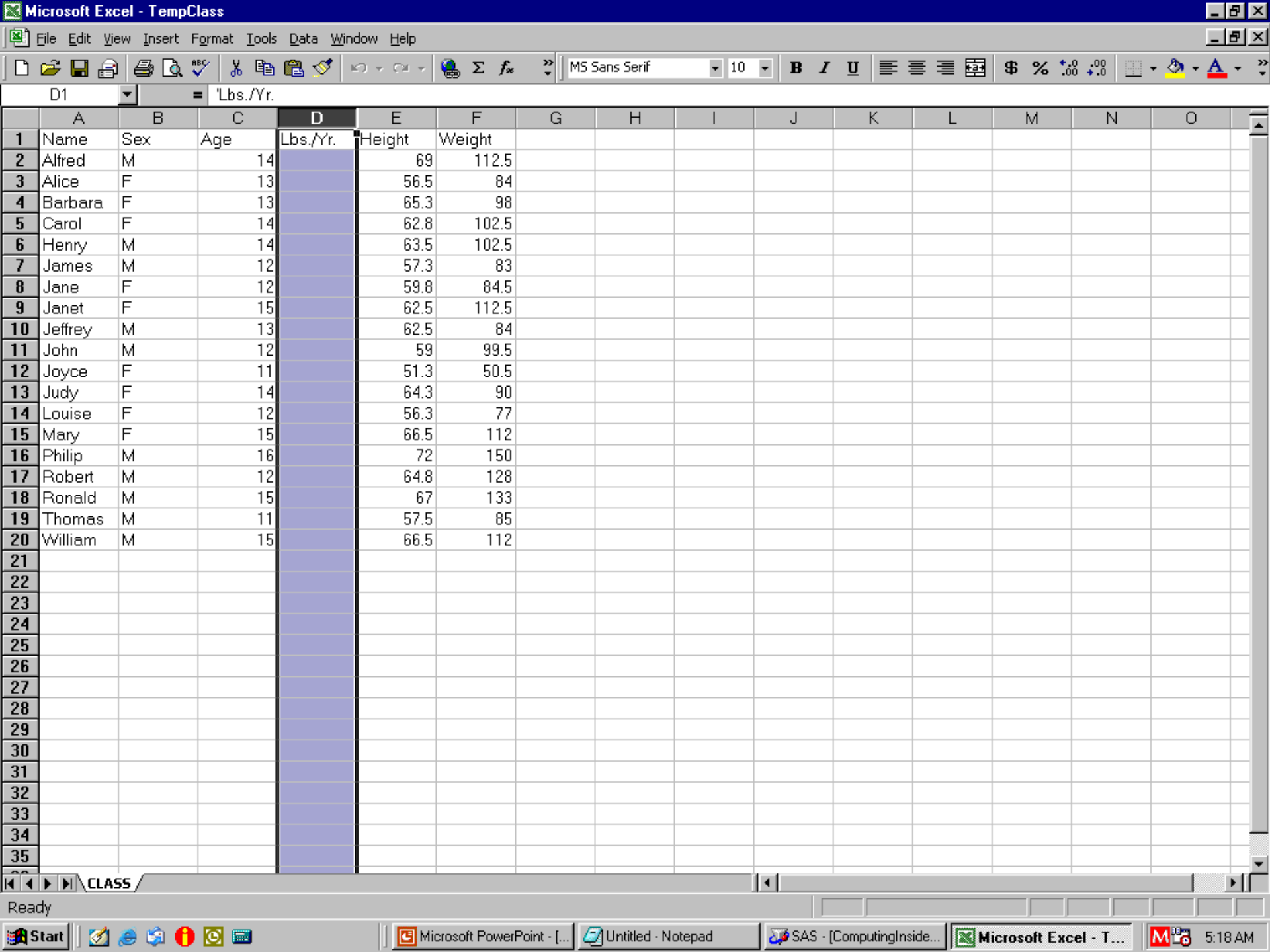
33															
34															
35															

Format Cells in Column like SAS Format 4.1

```
 /* no need to re-select column,
    focus still there */
data _null_;
file DDEcmds;
put '[Format.Number("#0.0")]';
run;
```

Insert a Heading for New Column 4

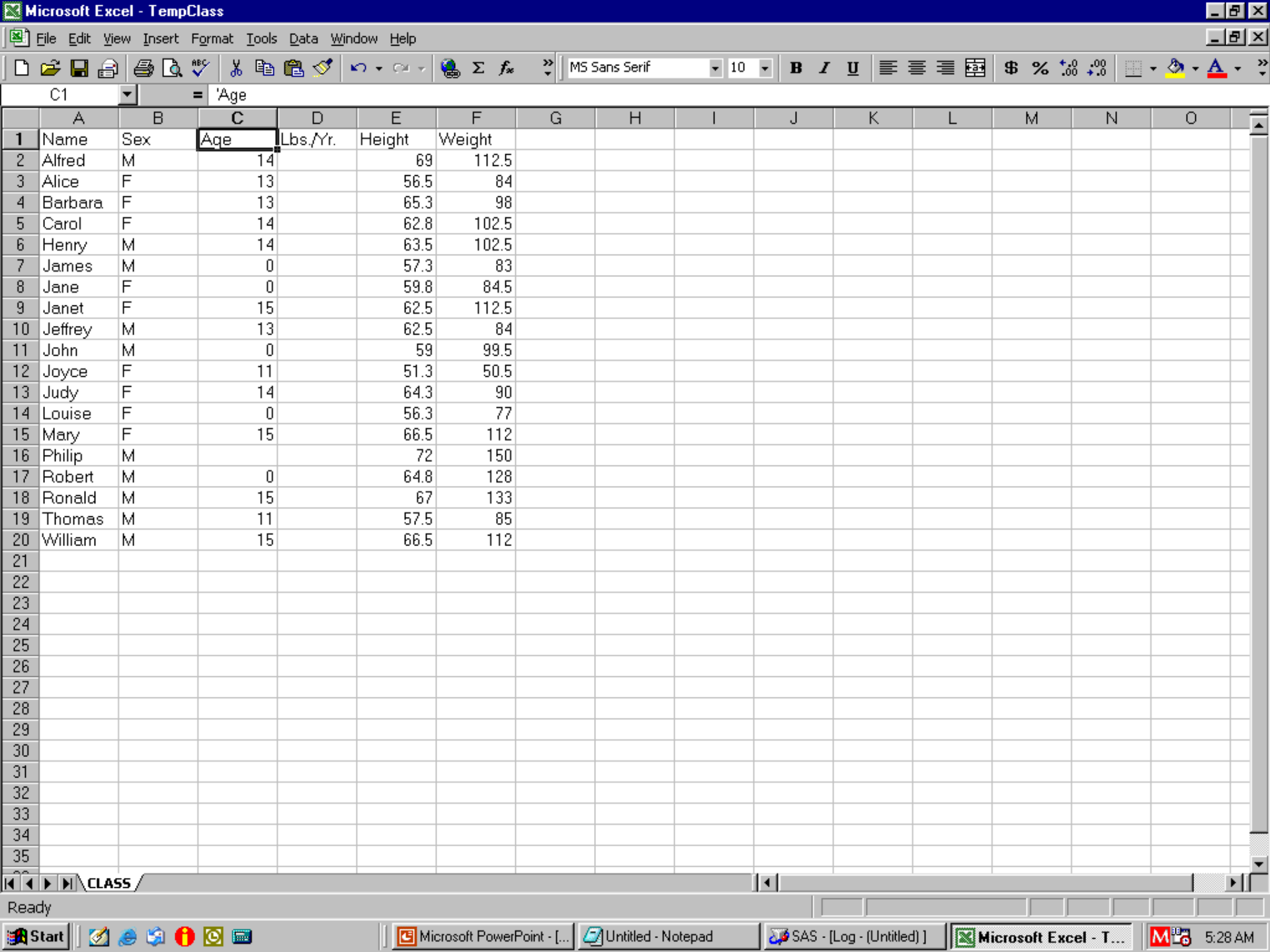
```
filename Cell1 DDE "EXCEL|Class!R1C4";
data _null_;
file Cell1;
put ‘Lbs./Yr.';
run;
```



	A	B	C	D	E	F
1	Name	Sex	Age	Lbs./Yr.	Height	Weight
2	Alfred	M	14		69	112.5
3	Alice	F	13		56.5	84
4	Barbara	F	13		65.3	98
5	Carol	F	14		62.8	102.5
6	Henry	M	14		63.5	102.5
7	James	M	12		57.3	83
8	Jane	F	12		59.8	84.5
9	Janet	F	15		62.5	112.5
10	Jeffrey	M	13		62.5	84
11	John	M	12		59	99.5
12	Joyce	F	11		51.3	50.5
13	Judy	F	14		64.3	90
14	Louise	F	12		56.3	77
15	Mary	F	15		66.5	112
16	Philip	M	16		72	150
17	Robert	M	12		64.8	128
18	Ronald	M	15		67	133
19	Thomas	M	11		57.5	85
20	William	M	15		66.5	112

Column 3 to be Divisor
Create some null (missing) values
Create some 0 values

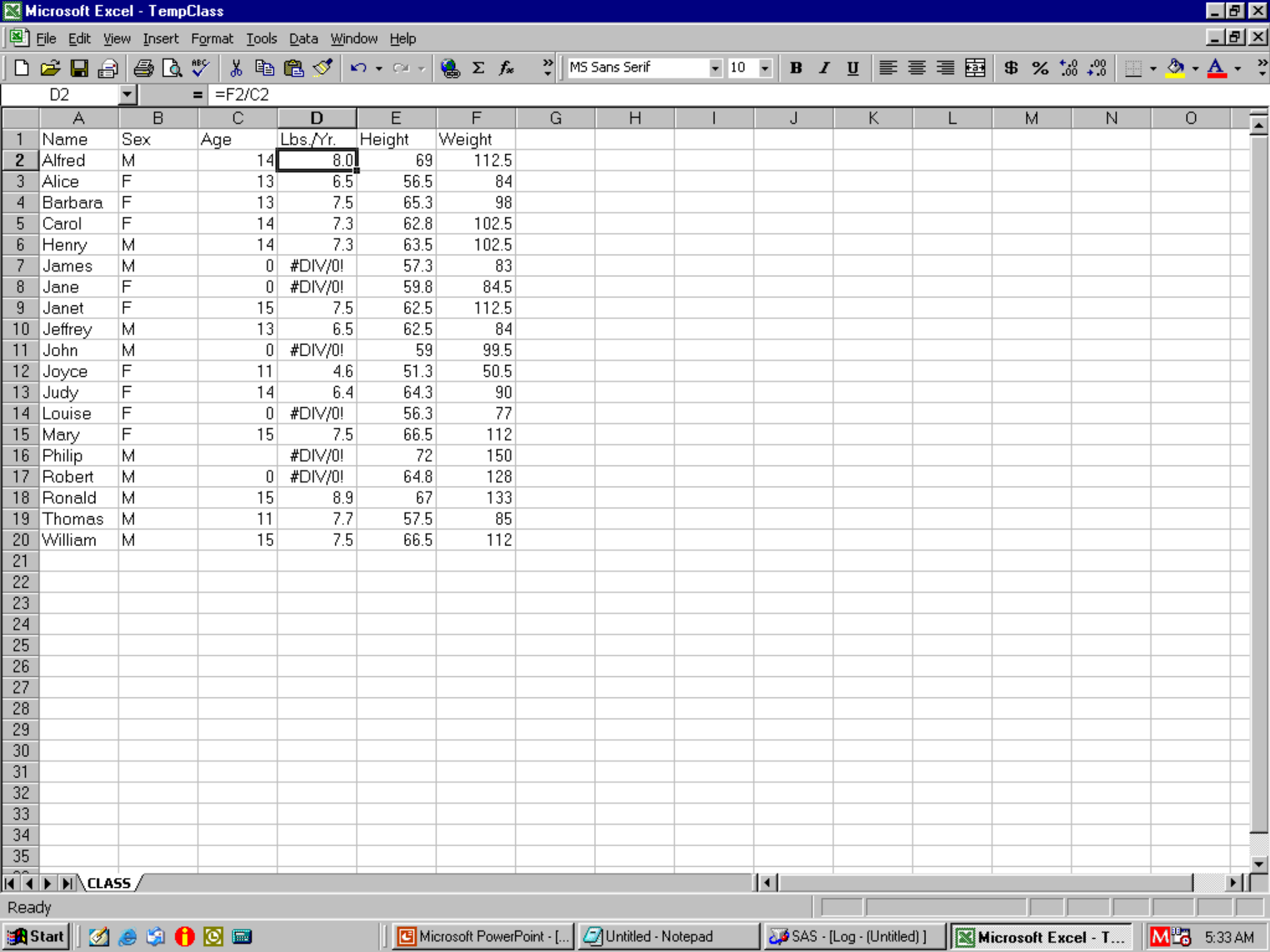
```
data _null_;
file DDEcmds;
put '[select("C3")]';
put '[formula.replace("16",  "",1,,false,false)]';
put '[formula.replace("12","0",1,,false,false)]';
put '[select("R1C3")]';  /* remove highlight */
run;
```



	A	B	C	D	E	F
1	Name	Sex	Age	Lbs./Yr.	Height	Weight
2	Alfred	M	14		69	112.5
3	Alice	F	13		56.5	84
4	Barbara	F	13		65.3	98
5	Carol	F	14		62.8	102.5
6	Henry	M	14		63.5	102.5
7	James	M	0		57.3	83
8	Jane	F	0		59.8	84.5
9	Janet	F	15		62.5	112.5
10	Jeffrey	M	13		62.5	84
11	John	M	0		59	99.5
12	Joyce	F	11		51.3	50.5
13	Judy	F	14		64.3	90
14	Louise	F	0		56.3	77
15	Mary	F	15		66.5	112
16	Philip	M			72	150
17	Robert	M	0		64.8	128
18	Ronald	M	15		67	133
19	Thomas	M	11		57.5	85
20	William	M	15		66.5	112

Divide Weight By Age

```
data _null_;
file DDEcmds;
put '[select("R2C4")]';
put '[formula.fill
      ("=RC[+2]/RC[-1]","R2C4:R20C4")]';
run;
```

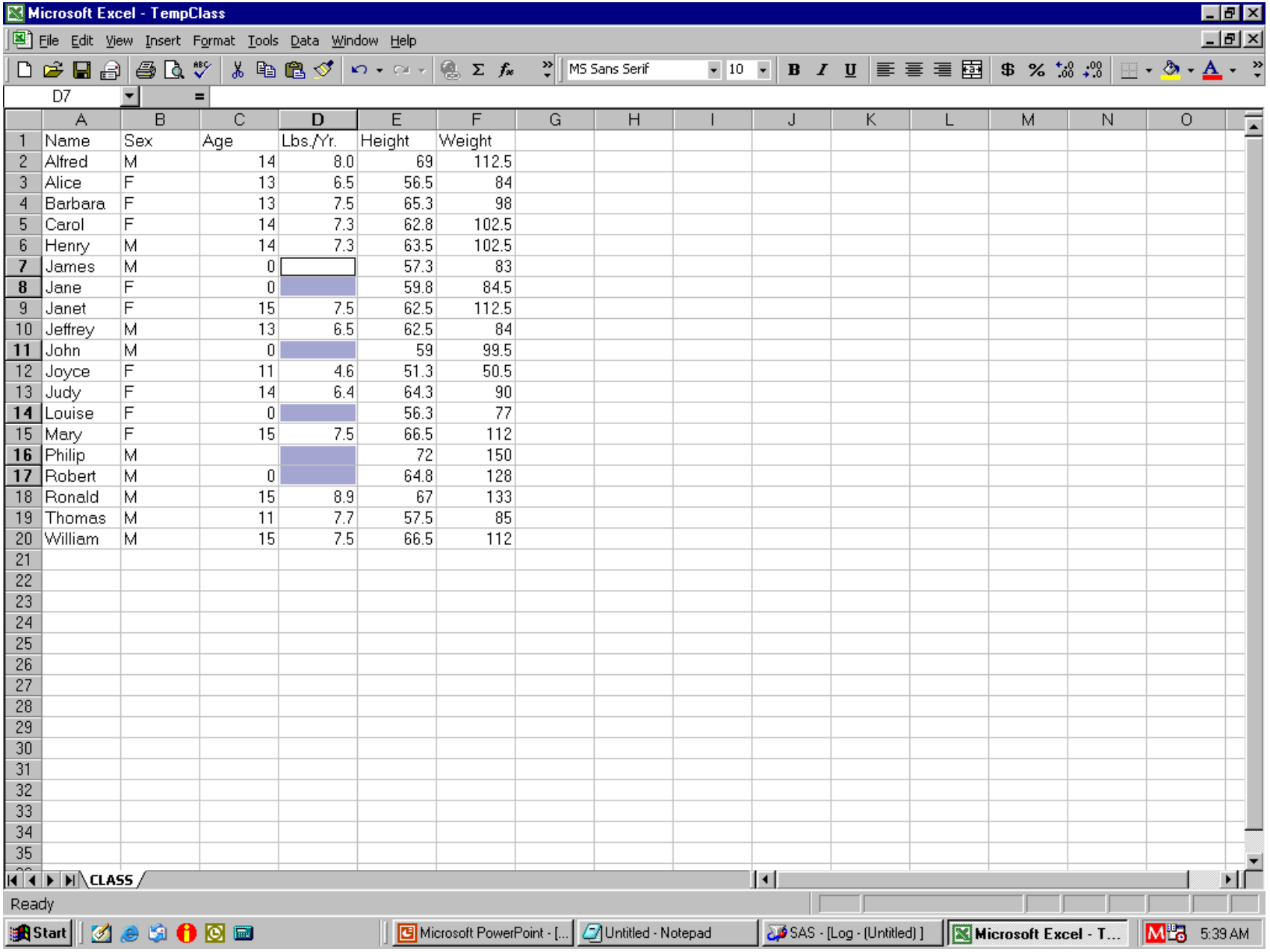


	A	B	C	D	E	F
1	Name	Sex	Age	Lbs./Yr.	Height	Weight
2	Alfred	M	14	8.0	69	112.5
3	Alice	F	13	6.5	56.5	84
4	Barbara	F	13	7.5	65.3	98
5	Carol	F	14	7.3	62.8	102.5
6	Henry	M	14	7.3	63.5	102.5
7	James	M	0	#DIV/0!	57.3	83
8	Jane	F	0	#DIV/0!	59.8	84.5
9	Janet	F	15	7.5	62.5	112.5
10	Jeffrey	M	13	6.5	62.5	84
11	John	M	0	#DIV/0!	59	99.5
12	Joyce	F	11	4.6	51.3	50.5
13	Judy	F	14	6.4	64.3	90
14	Louise	F	0	#DIV/0!	56.3	77
15	Mary	F	15	7.5	66.5	112
16	Philip	M		#DIV/0!	72	150
17	Robert	M	0	#DIV/0!	64.8	128
18	Ronald	M	15	8.9	67	133
19	Thomas	M	11	7.7	57.5	85
20	William	M	15	7.5	66.5	112

Get Rid of Error Message #DIV/0!

```
data _null_;
file DDEcmds;
put '[select.special(3,16)]';
put '[clear]';
run;
```

Cleared Cells Remain Selected



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	Name	Sex	Age	Lbs./Yr.	Height	Weight									
2	Alfred	M	14	8.0	69	112.5									
3	Alice	F	13	6.5	56.5	84									
4	Barbara	F	13	7.5	65.3	98									
5	Carol	F	14	7.3	62.8	102.5									
6	Henry	M	14	7.3	63.5	102.5									
7	James	M	0		57.3	83									
8	Jane	F	0		59.8	84.5									
9	Janet	F	15	7.5	62.5	112.5									
10	Jeffrey	M	13	6.5	62.5	84									
11	John	M	0		59	99.5									
12	Joyce	F	11	4.6	51.3	50.5									
13	Judy	F	14	6.4	64.3	90									
14	Louise	F	0		56.3	77									
15	Mary	F	15	7.5	66.5	112									
16	Philip	M			72	150									
17	Robert	M	0		64.8	128									
18	Ronald	M	15	8.9	67	133									
19	Thomas	M	11	7.7	57.5	85									
20	William	M	15	7.5	66.5	112									
21															
22															
23															
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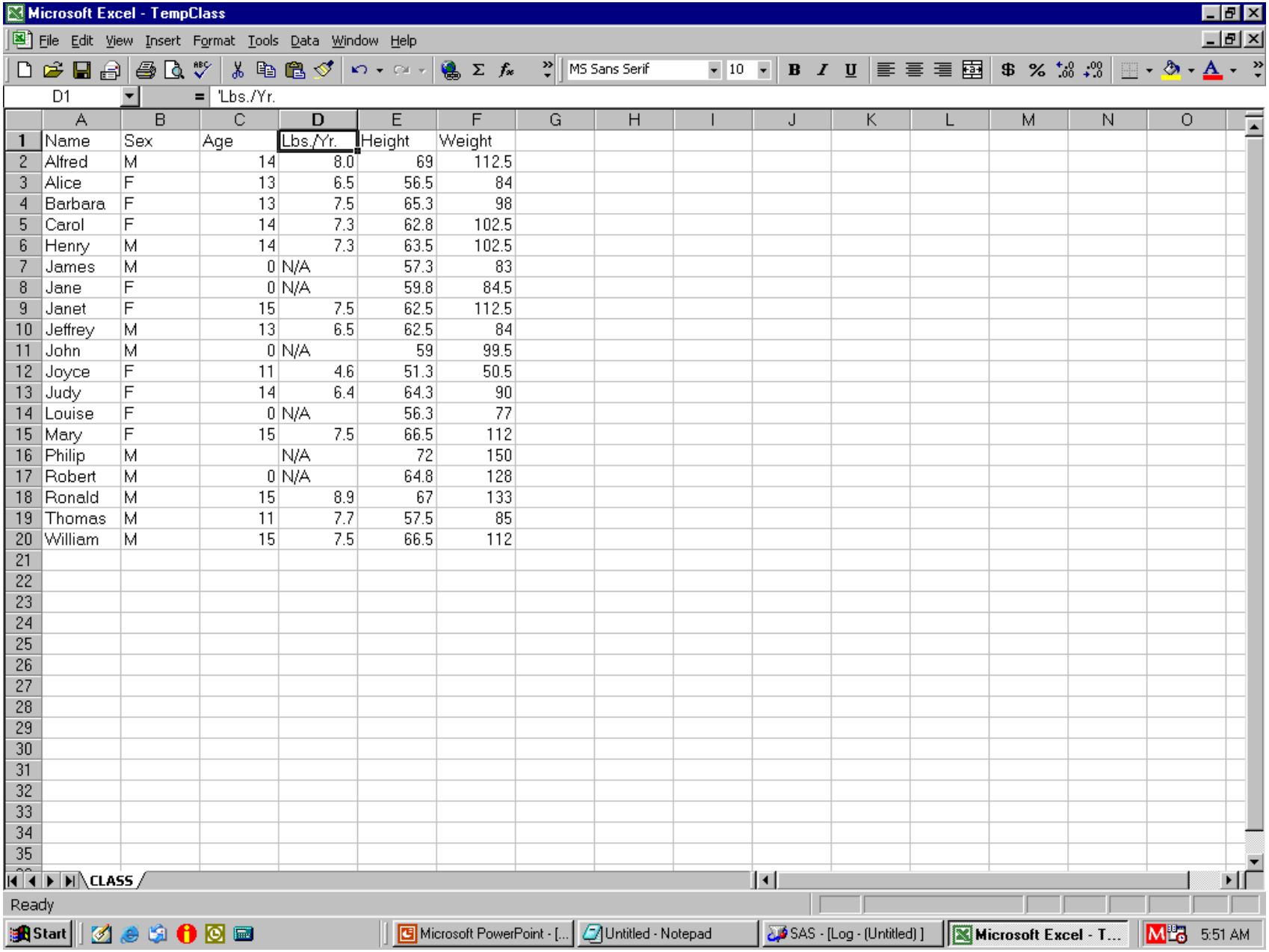
25															
26															
27															
28															
29															
30															
31															
32															
33															
34															
35															

Replace Nulls with “N/A”

```
data _null_;
file DDEcmds;
put '[formula.replace("","N/A",1,,false,false)]';
put ‘[select("R1C4")]’;  /* remove highlight */
run;
```

Almost Finished



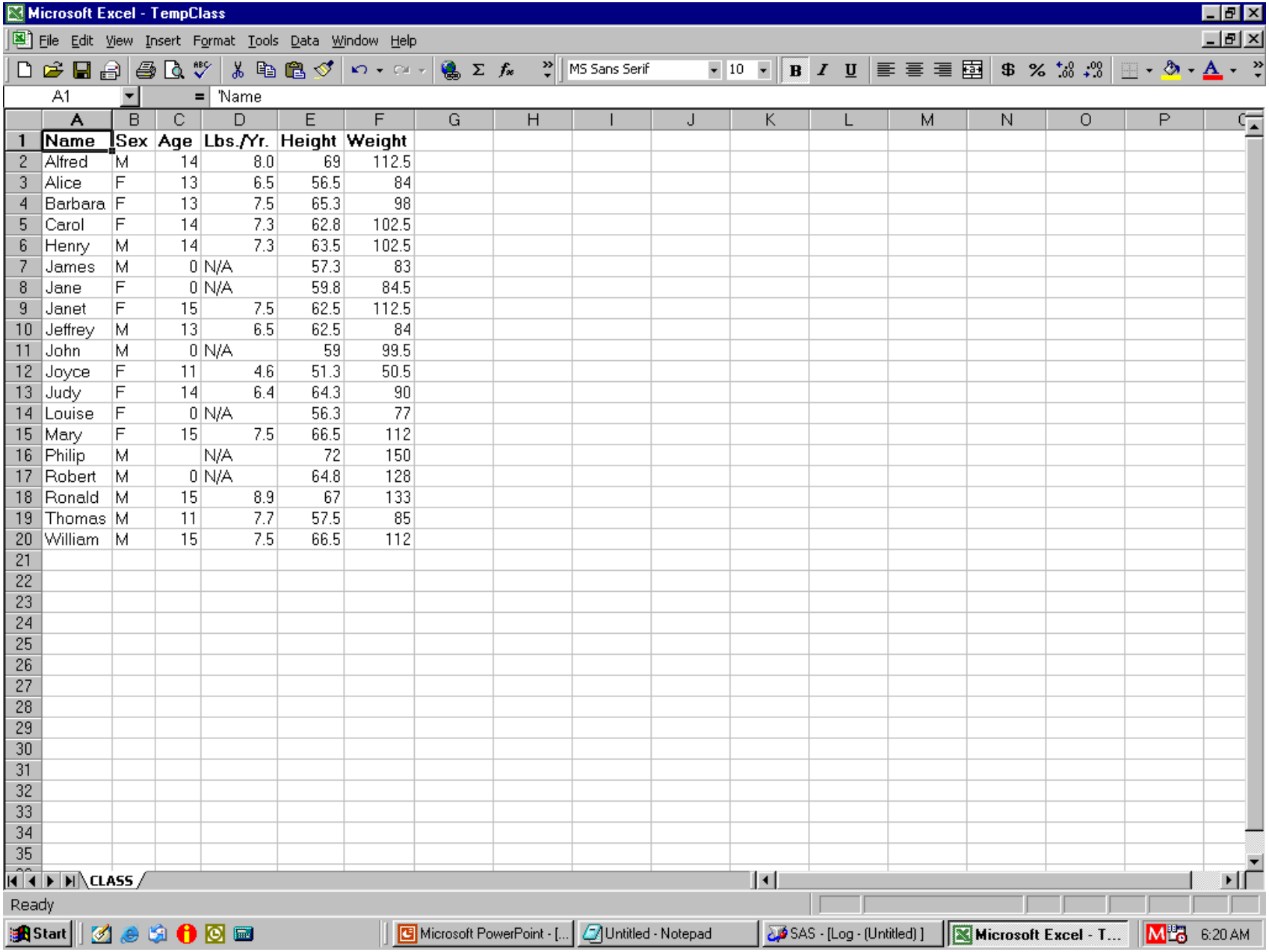
	A	B	C	D	E	F
1	Name	Sex	Age	Lbs./Yr.	Height	Weight
2	Alfred	M	14	8.0	69	112.5
3	Alice	F	13	6.5	56.5	84
4	Barbara	F	13	7.5	65.3	98
5	Carol	F	14	7.3	62.8	102.5
6	Henry	M	14	7.3	63.5	102.5
7	James	M	0	N/A	57.3	83
8	Jane	F	0	N/A	59.8	84.5
9	Janet	F	15	7.5	62.5	112.5
10	Jeffrey	M	13	6.5	62.5	84
11	John	M	0	N/A	59	99.5
12	Joyce	F	11	4.6	51.3	50.5
13	Judy	F	14	6.4	64.3	90
14	Louise	F	0	N/A	56.3	77
15	Mary	F	15	7.5	66.5	112
16	Philip	M		N/A	72	150
17	Robert	M	0	N/A	64.8	128
18	Ronald	M	15	8.9	67	133
19	Thomas	M	11	7.7	57.5	85
20	William	M	15	7.5	66.5	112

Formatting Headings & Data

Bold Headings & AutoFit Columns

```
data _null_;        /* also, remove the highlight */
file DDEcmds;
put '[select("R1")]';
put '[font.properties("","Bold")]';
                          /* "", = font unchanged */
put '[select("C1:C6")]';
put '[column.width(,,,3)]'; /* commas req'd. */
                           /* 3 = AutoFit */
put '[select("R1C1")]';  run;
```

Better, But Still Not Finished

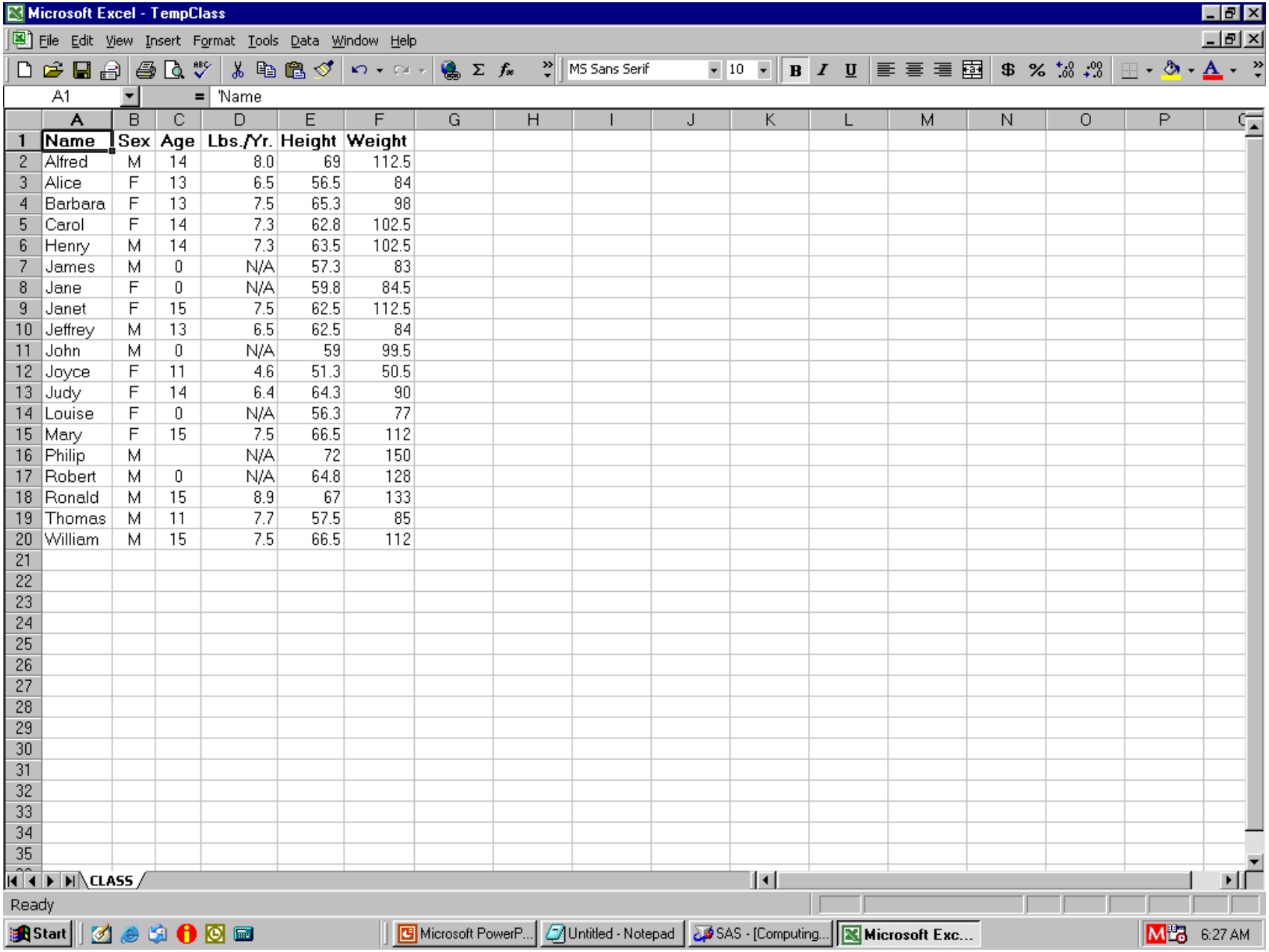


	A	B	C	D	E	F
1	Name	Sex	Age	Lbs./Yr.	Height	Weight
2	Alfred	M	14	8.0	69	112.5
3	Alice	F	13	6.5	56.5	84
4	Barbara	F	13	7.5	65.3	98
5	Carol	F	14	7.3	62.8	102.5
6	Henry	M	14	7.3	63.5	102.5
7	James	M	0	N/A	57.3	83
8	Jane	F	0	N/A	59.8	84.5
9	Janet	F	15	7.5	62.5	112.5
10	Jeffrey	M	13	6.5	62.5	84
11	John	M	0	N/A	59	99.5
12	Joyce	F	11	4.6	51.3	50.5
13	Judy	F	14	6.4	64.3	90
14	Louise	F	0	N/A	56.3	77
15	Mary	F	15	7.5	66.5	112
16	Philip	M		N/A	72	150
17	Robert	M	0	N/A	64.8	128
18	Ronald	M	15	8.9	67	133
19	Thomas	M	11	7.7	57.5	85
20	William	M	15	7.5	66.5	112

Align Some Columns

```
data _null_;
file DDEcmds;
put '[select("C2:C3")]'; /* Sex & Age Columns */
put '[alignment(3,false,3,0)]'; /* 3 = Center */
put '[select("C4")]'; /* Lbs. / Yr. Column */
put '[alignment(4,false,3,0)]'; /* 4 = Right */
put '[select("R1C1")]';
run;
```

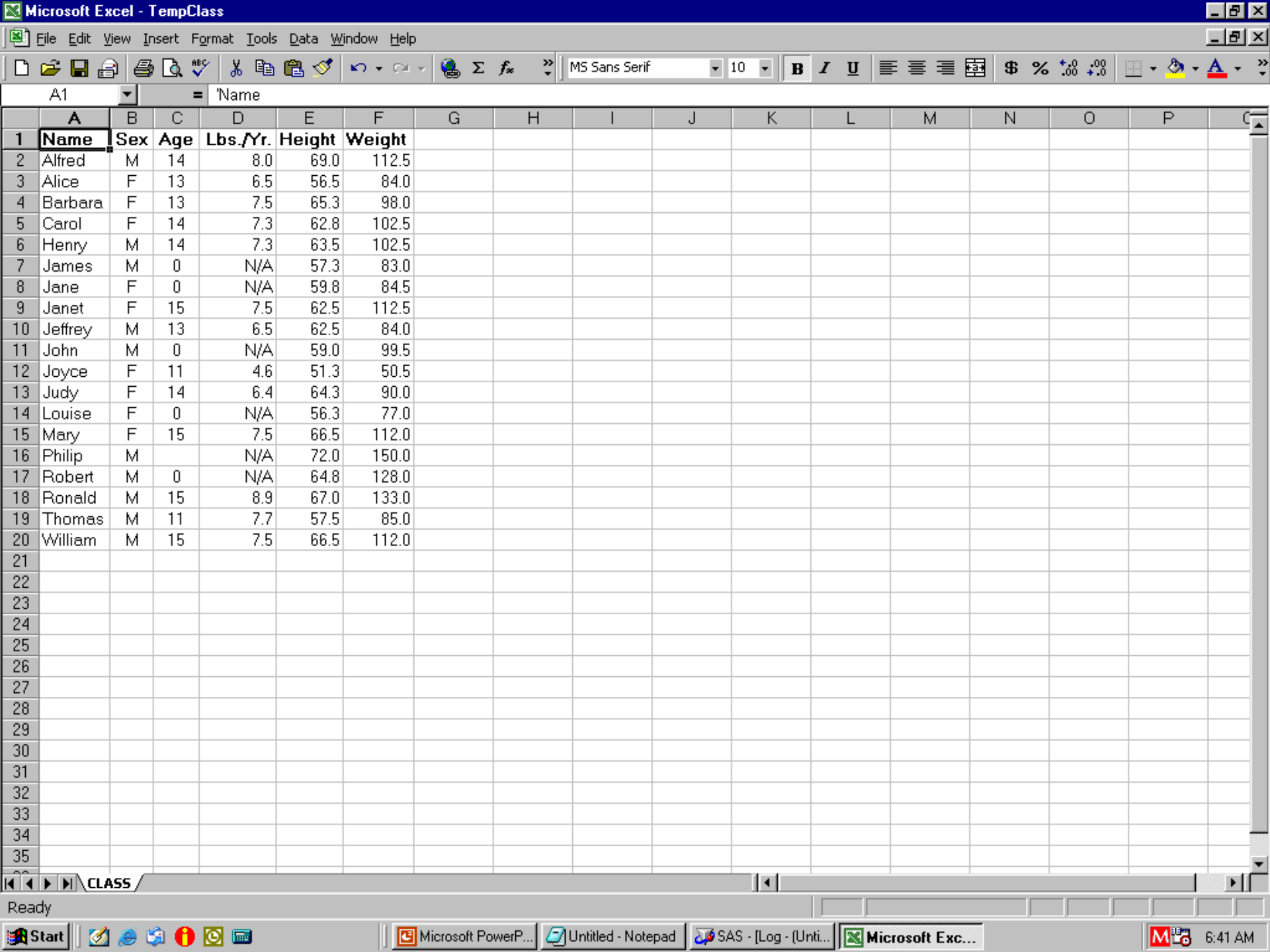
Need Fix Format of Height, Weight



	A	B	C	D	E	F
1	Name	Sex	Age	Lbs./Yr.	Height	Weight
2	Alfred	M	14	8.0	69	112.5
3	Alice	F	13	6.5	56.5	84
4	Barbara	F	13	7.5	65.3	98
5	Carol	F	14	7.3	62.8	102.5
6	Henry	M	14	7.3	63.5	102.5
7	James	M	0	N/A	57.3	83
8	Jane	F	0	N/A	59.8	84.5
9	Janet	F	15	7.5	62.5	112.5
10	Jeffrey	M	13	6.5	62.5	84
11	John	M	0	N/A	59	99.5
12	Joyce	F	11	4.6	51.3	50.5
13	Judy	F	14	6.4	64.3	90
14	Louise	F	0	N/A	56.3	77
15	Mary	F	15	7.5	66.5	112
16	Philip	M		N/A	72	150
17	Robert	M	0	N/A	64.8	128
18	Ronald	M	15	8.9	67	133
19	Thomas	M	11	7.7	57.5	85
20	William	M	15	7.5	66.5	112

Format Hgt & Wgt Columns as 4.1

```
data _null_;
file DDEcmds;
put '[select("C5:C6")]';
put '[format.number("#0.0")]';
put '[select("R1C1")]';
run;
```



	Name	Sex	Age	Lbs./Yr.	Height	Weight
2	Alfred	M	14	8.0	69.0	112.5
3	Alice	F	13	6.5	56.5	84.0
4	Barbara	F	13	7.5	65.3	98.0
5	Carol	F	14	7.3	62.8	102.5
6	Henry	M	14	7.3	63.5	102.5
7	James	M	0	N/A	57.3	83.0
8	Jane	F	0	N/A	59.8	84.5
9	Janet	F	15	7.5	62.5	112.5
10	Jeffrey	M	13	6.5	62.5	84.0
11	John	M	0	N/A	59.0	99.5
12	Joyce	F	11	4.6	51.3	50.5
13	Judy	F	14	6.4	64.3	90.0
14	Louise	F	0	N/A	56.3	77.0
15	Mary	F	15	7.5	66.5	112.0
16	Philip	M		N/A	72.0	150.0
17	Robert	M	0	N/A	64.8	128.0
18	Ronald	M	15	8.9	67.0	133.0
19	Thomas	M	11	7.7	57.5	85.0
20	William	M	15	7.5	66.5	112.0

- Remaining Slides Not In the Paper
- Code Used Available Via Email

Excel Subtotals

Two Solutions

1. Separate Custom Worksheets for each level
2. DDE use* of Excel's subtotals

*Requires a pre-built Excel macro for one step

Excel Subtotals Solution 1

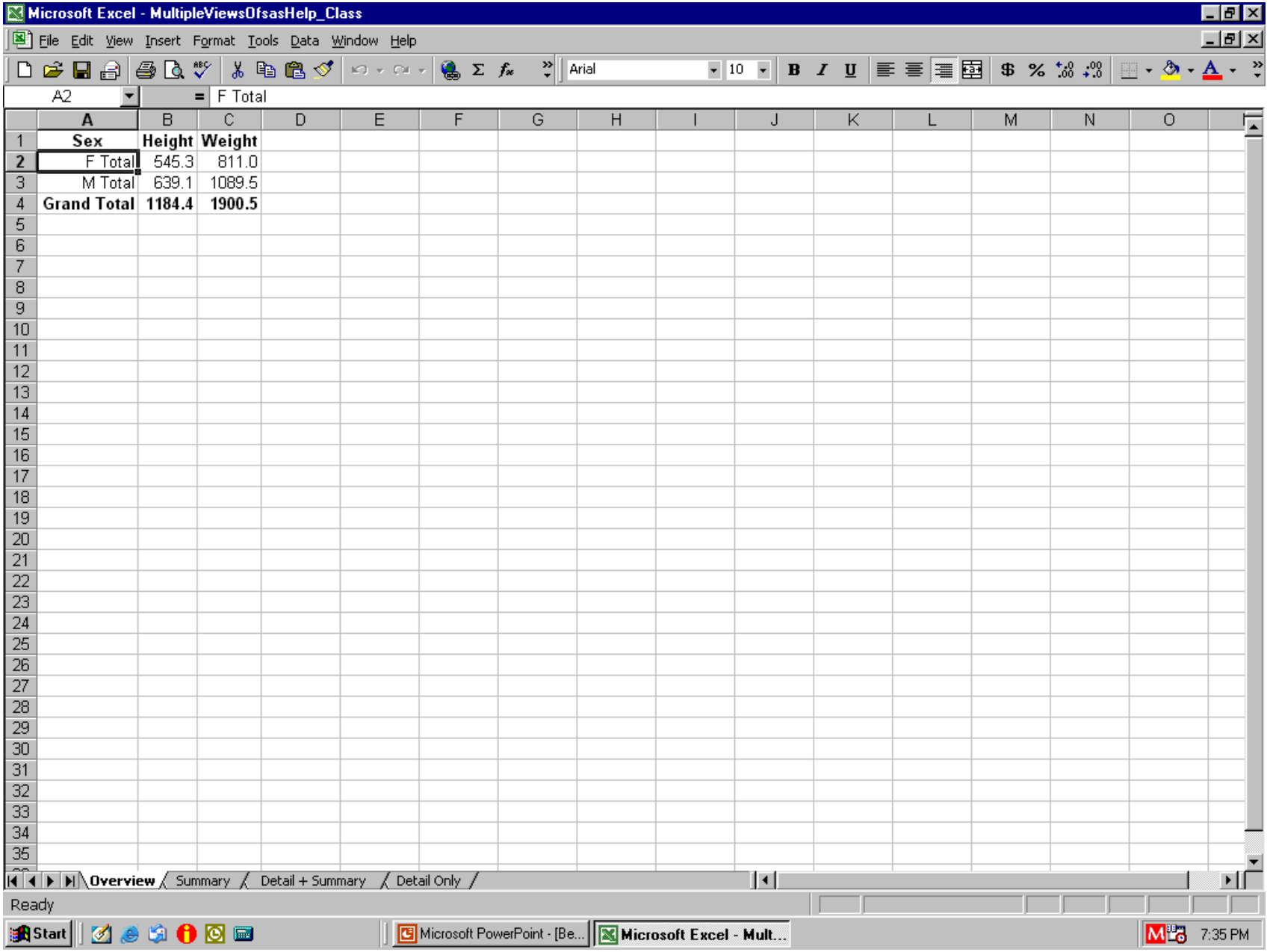
Separate Custom Worksheets For Each Level

Alternative to Excel Subtotals

Another Way to Do Subtotals

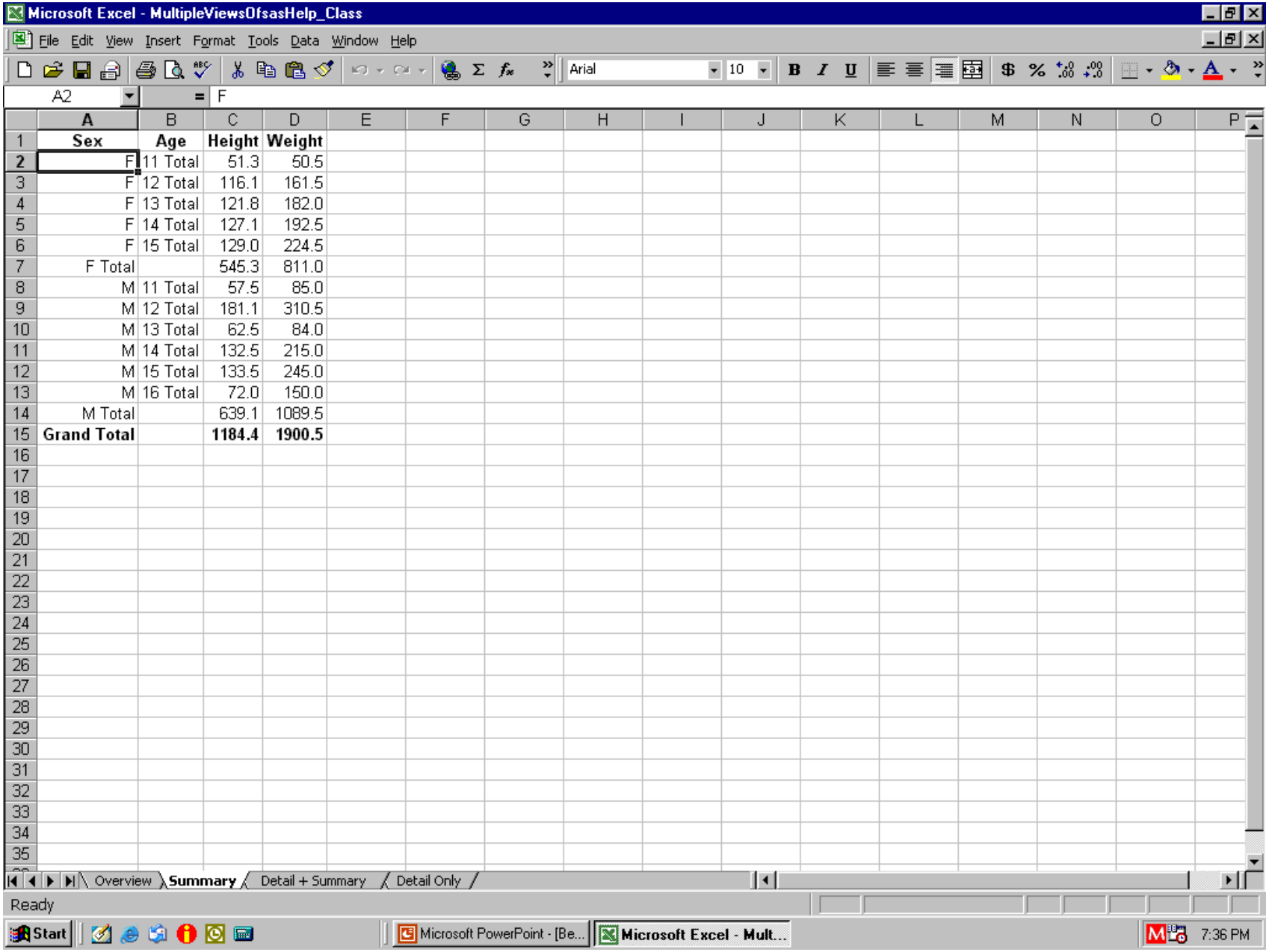
- Custom Design: Really “Have It Your Way”
- Prepare
  multiple pre-formatted empty WorkSheets
- Load them via DDE
- May have to use Software Intelligence
  for post-load formatting
- User moves from “level” to “level”
  via Tab Navigation, not Excel “Level Buttons”
- Here showing only results, not code

Overview WorkSheet



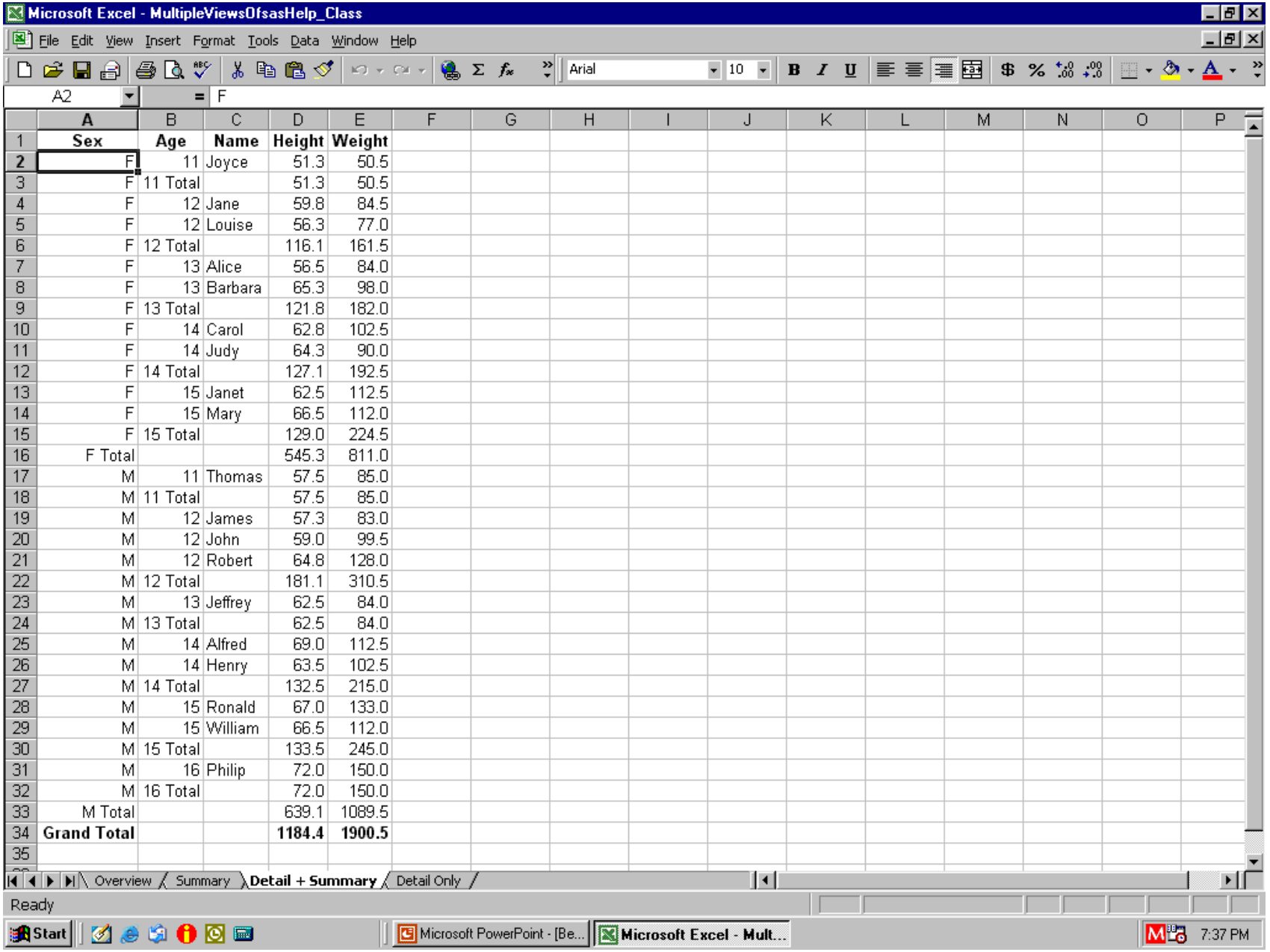
	A	B	C
1	**Sex**	**Height**	**Weight**
2	F Total	545.3	811.0
3	M Total	639.1	1089.5
4	**Grand Total**	**1184.4**	**1900.5**

Summary WorkSheet



	A	B	C	D
1	**Sex**	**Age**	**Height**	**Weight**
2	F	11 Total	51.3	50.5
3	F	12 Total	116.1	161.5
4	F	13 Total	121.8	182.0
5	F	14 Total	127.1	192.5
6	F	15 Total	129.0	224.5
7	F Total		545.3	811.0
8	M	11 Total	57.5	85.0
9	M	12 Total	181.1	310.5
10	M	13 Total	62.5	84.0
11	M	14 Total	132.5	215.0
12	M	15 Total	133.5	245.0
13	M	16 Total	72.0	150.0
14	M Total		639.1	1089.5
15	**Grand Total**		**1184.4**	**1900.5**

Detail + Summary WorkSheet



Microsoft Excel - MultipleViewsOfsasHelp_Class

File Edit View Insert Format Tools Data Window Help

Arial 10

A2 = F

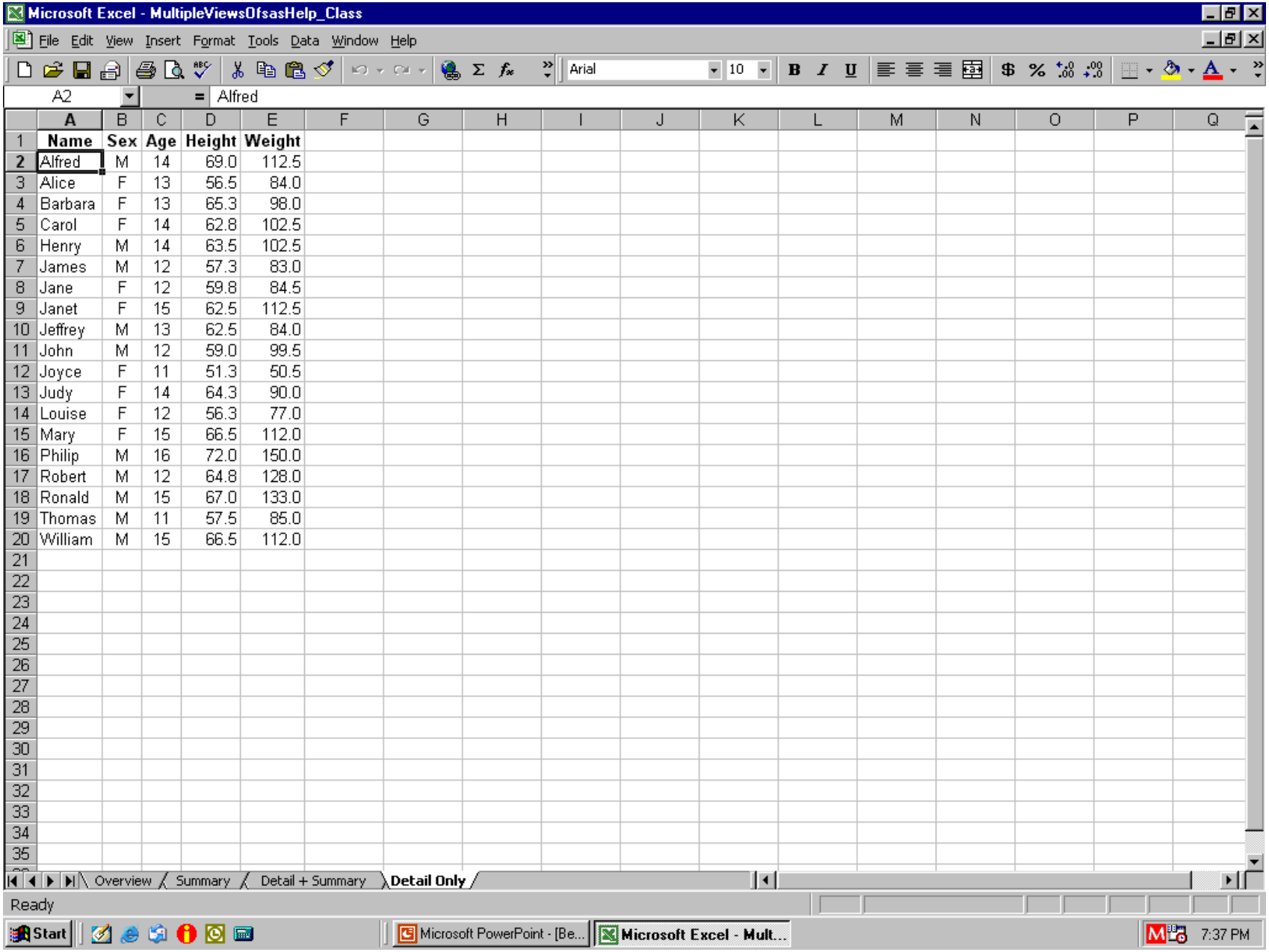
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	**Sex**	**Age**	**Name**	**Height**	**Weight**											
2	F	11	Joyce	51.3	50.5											
3	F	11 Total		51.3	50.5											
4	F	12	Jane	59.8	84.5											
5	F	12	Louise	56.3	77.0											
6	F	12 Total		116.1	161.5											
7	F	13	Alice	56.5	84.0											
8	F	13	Barbara	65.3	98.0											
9	F	13 Total		121.8	182.0											
10	F	14	Carol	62.8	102.5											
11	F	14	Judy	64.3	90.0											
12	F	14 Total		127.1	192.5											
13	F	15	Janet	62.5	112.5											
14	F	15	Mary	66.5	112.0											
15	F	15 Total		129.0	224.5											
16	F Total			545.3	811.0											
17	M	11	Thomas	57.5	85.0											
18	M	11 Total		57.5	85.0											
19	M	12	James	57.3	83.0											
20	M	12	John	59.0	99.5											
21	M	12	Robert	64.8	128.0											
22	M	12 Total		181.1	310.5											
23	M	13	Jeffrey	62.5	84.0											
24	M	13 Total		62.5	84.0											
25	M	14	Alfred	69.0	112.5											
26	M	14	Henry	63.5	102.5											
27	M	14 Total		132.5	215.0											
28	M	15	Ronald	67.0	133.0											
29	M	15	William	66.5	112.0											
30	M	15 Total		133.5	245.0											
31	M	16	Philip	72.0	150.0											
32	M	16 Total		72.0	150.0											
33	M Total			639.1	1089.5											
34	**Grand Total**			**1184.4**	**1900.5**											
35																

Overview | Summary | **Detail + Summary** | Detail Only

Ready

Start | Microsoft PowerPoint - [Be... | Microsoft Excel - Mult... | 7:37 PM

Detail Only WorkSheet

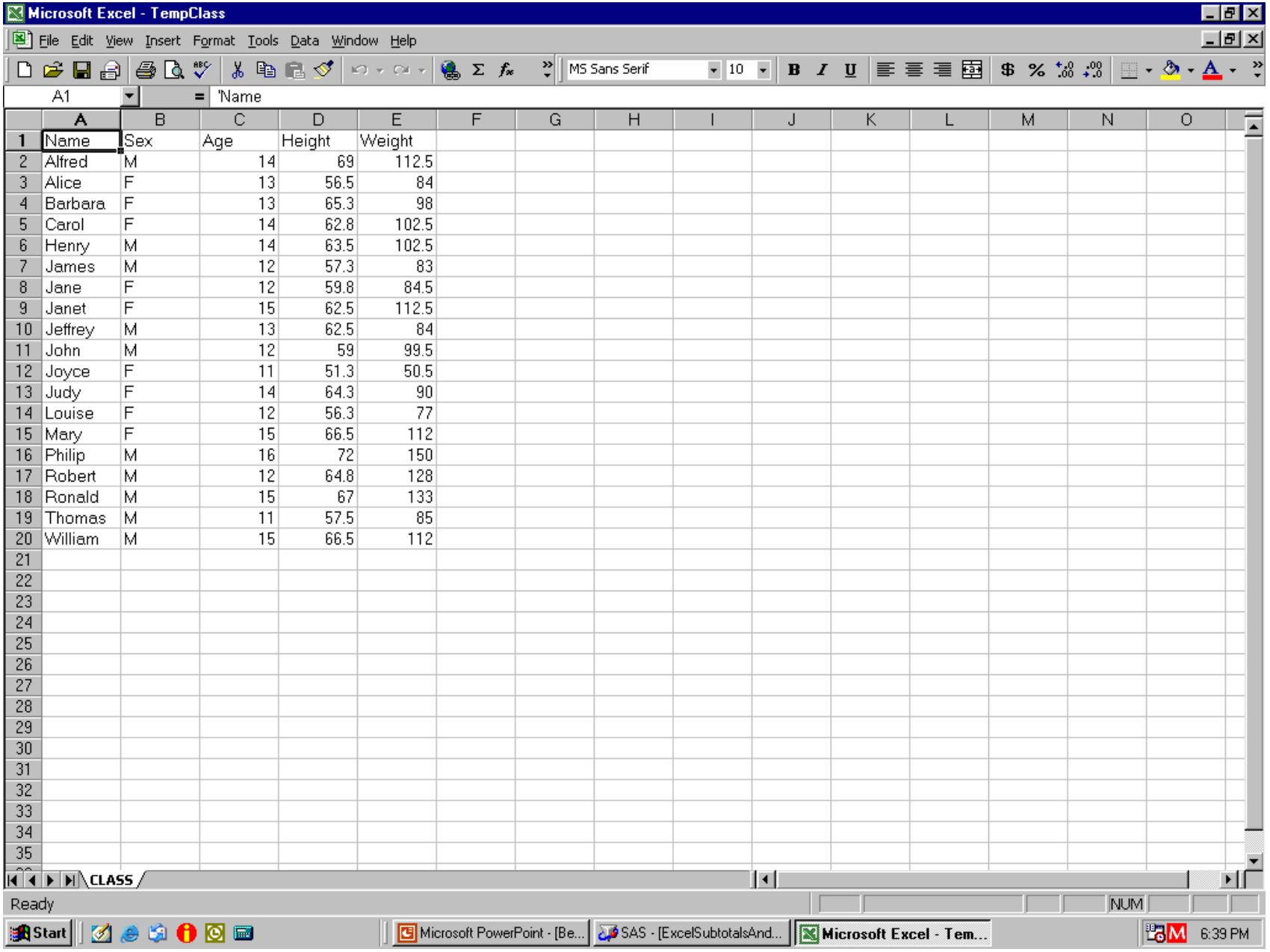


	A	B	C	D	E
1	**Name**	**Sex**	**Age**	**Height**	**Weight**
2	Alfred	M	14	69.0	112.5
3	Alice	F	13	56.5	84.0
4	Barbara	F	13	65.3	98.0
5	Carol	F	14	62.8	102.5
6	Henry	M	14	63.5	102.5
7	James	M	12	57.3	83.0
8	Jane	F	12	59.8	84.5
9	Janet	F	15	62.5	112.5
10	Jeffrey	M	13	62.5	84.0
11	John	M	12	59.0	99.5
12	Joyce	F	11	51.3	50.5
13	Judy	F	14	64.3	90.0
14	Louise	F	12	56.3	77.0
15	Mary	F	15	66.5	112.0
16	Philip	M	16	72.0	150.0
17	Robert	M	12	64.8	128.0
18	Ronald	M	15	67.0	133.0
19	Thomas	M	11	57.5	85.0
20	William	M	15	66.5	112.0

Excel Subtotals Solution 2

DDE use of Excel’s subtotals

Loaded WorkSheet (e.g., via Export)



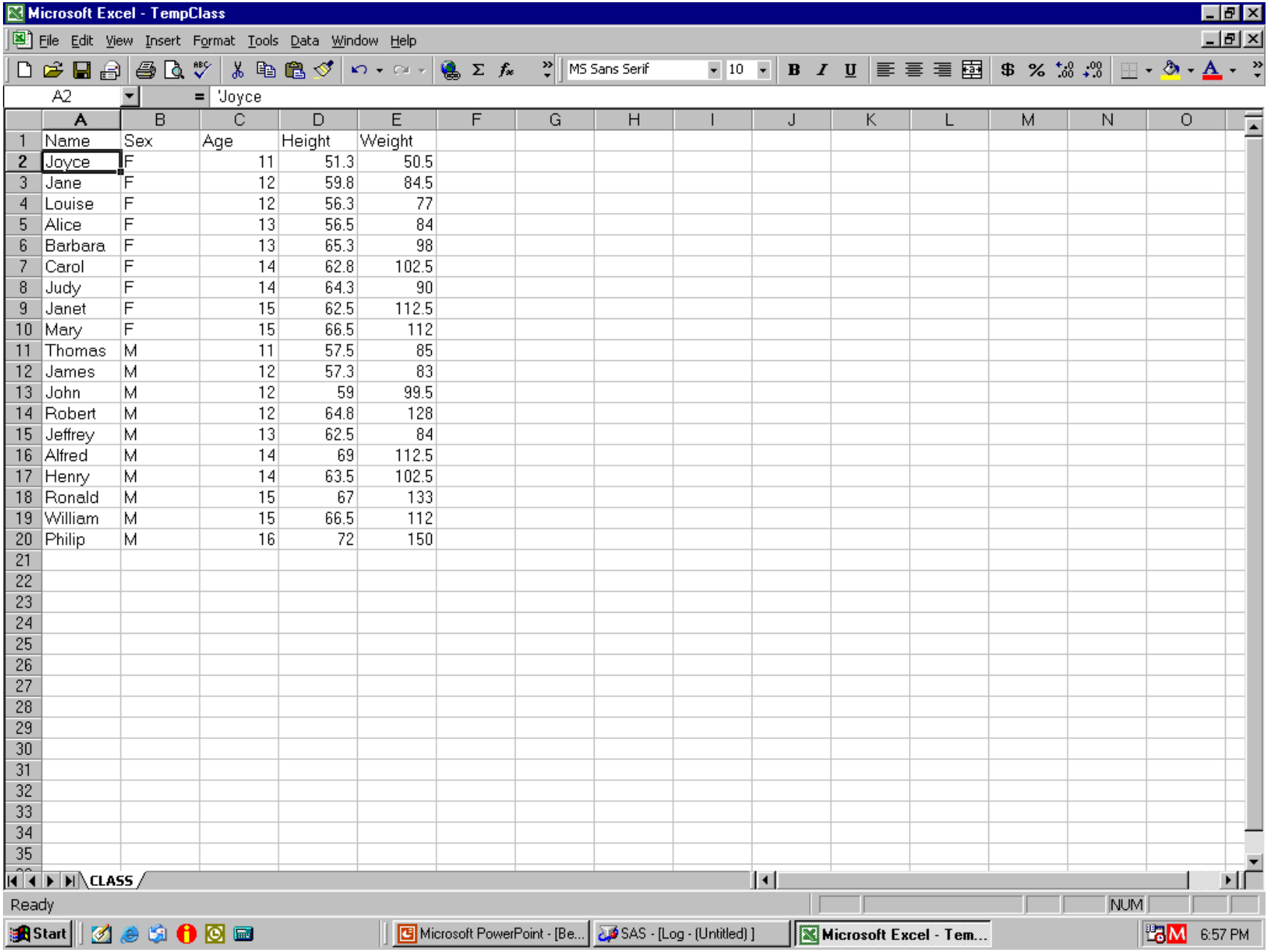
	A	B	C	D	E
1	Name	Sex	Age	Height	Weight
2	Alfred	M	14	69	112.5
3	Alice	F	13	56.5	84
4	Barbara	F	13	65.3	98
5	Carol	F	14	62.8	102.5
6	Henry	M	14	63.5	102.5
7	James	M	12	57.3	83
8	Jane	F	12	59.8	84.5
9	Janet	F	15	62.5	112.5
10	Jeffrey	M	13	62.5	84
11	John	M	12	59	99.5
12	Joyce	F	11	51.3	50.5
13	Judy	F	14	64.3	90
14	Louise	F	12	56.3	77
15	Mary	F	15	66.5	112
16	Philip	M	16	72	150
17	Robert	M	12	64.8	128
18	Ronald	M	15	67	133
19	Thomas	M	11	57.5	85
20	William	M	15	66.5	112

Sort the Data

```
data _null_;
file DDEcmds;
put '[select("R1C1:R65536C256")]; /* all cells */
put '[sort(1,"Sex",1,"Age",1,"Name",1,1,1,0)]';
put '[select("R2C1")]';  run;

/* "Key",1 = sort on Key ascending */
/* 1 = sort by rows */
/* 1,1,0 = Normal sort, Headers present,
            Not case sensitive */
```

By Name Within Age Within Sex

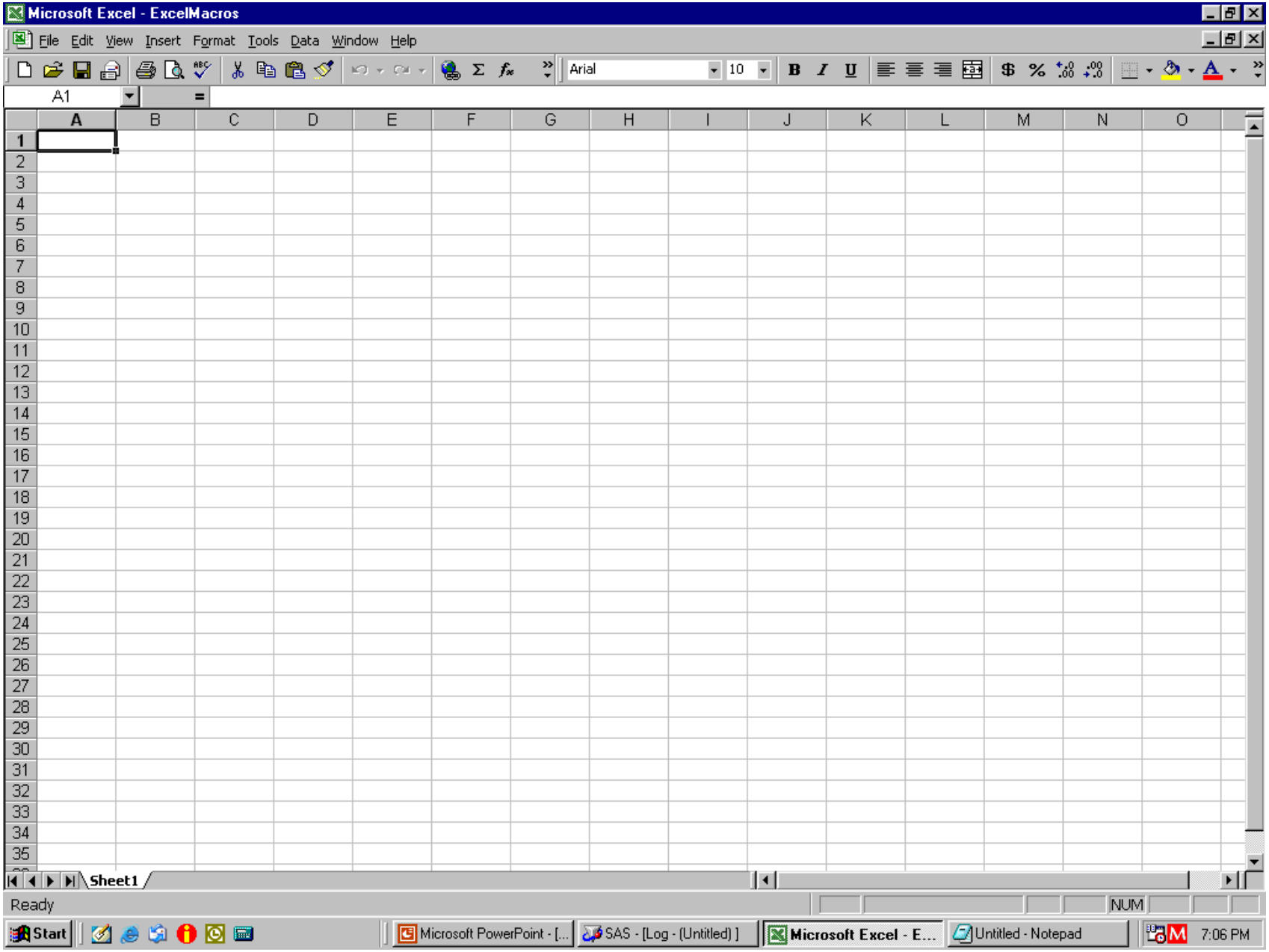


	A	B	C	D	E
1	Name	Sex	Age	Height	Weight
2	Joyce	F	11	51.3	50.5
3	Jane	F	12	59.8	84.5
4	Louise	F	12	56.3	77
5	Alice	F	13	56.5	84
6	Barbara	F	13	65.3	98
7	Carol	F	14	62.8	102.5
8	Judy	F	14	64.3	90
9	Janet	F	15	62.5	112.5
10	Mary	F	15	66.5	112
11	Thomas	M	11	57.5	85
12	James	M	12	57.3	83
13	John	M	12	59	99.5
14	Robert	M	12	64.8	128
15	Jeffrey	M	13	62.5	84
16	Alfred	M	14	69	112.5
17	Henry	M	14	63.5	102.5
18	Ronald	M	15	67	133
19	William	M	15	66.5	112
20	Philip	M	16	72	150

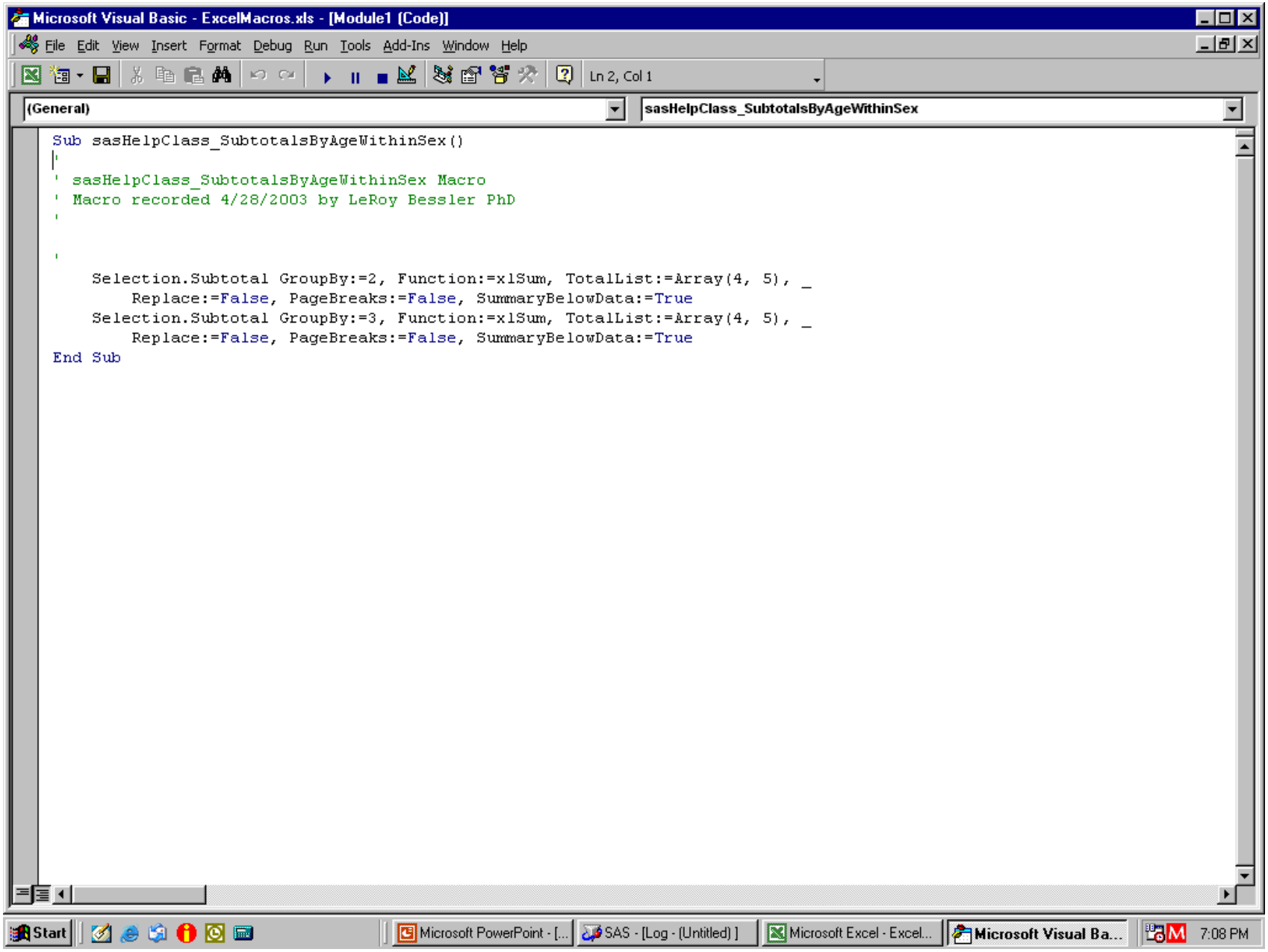
Close Data Workbook, Open a Workbook of Only Excel Macros

```
data _null_;
file DDEcmds;
put '[close(true)]';
x=sleep(1);
put '[open("C:\Folder\ExcelMacros.xls")]';
x=sleep(3);
run;
```

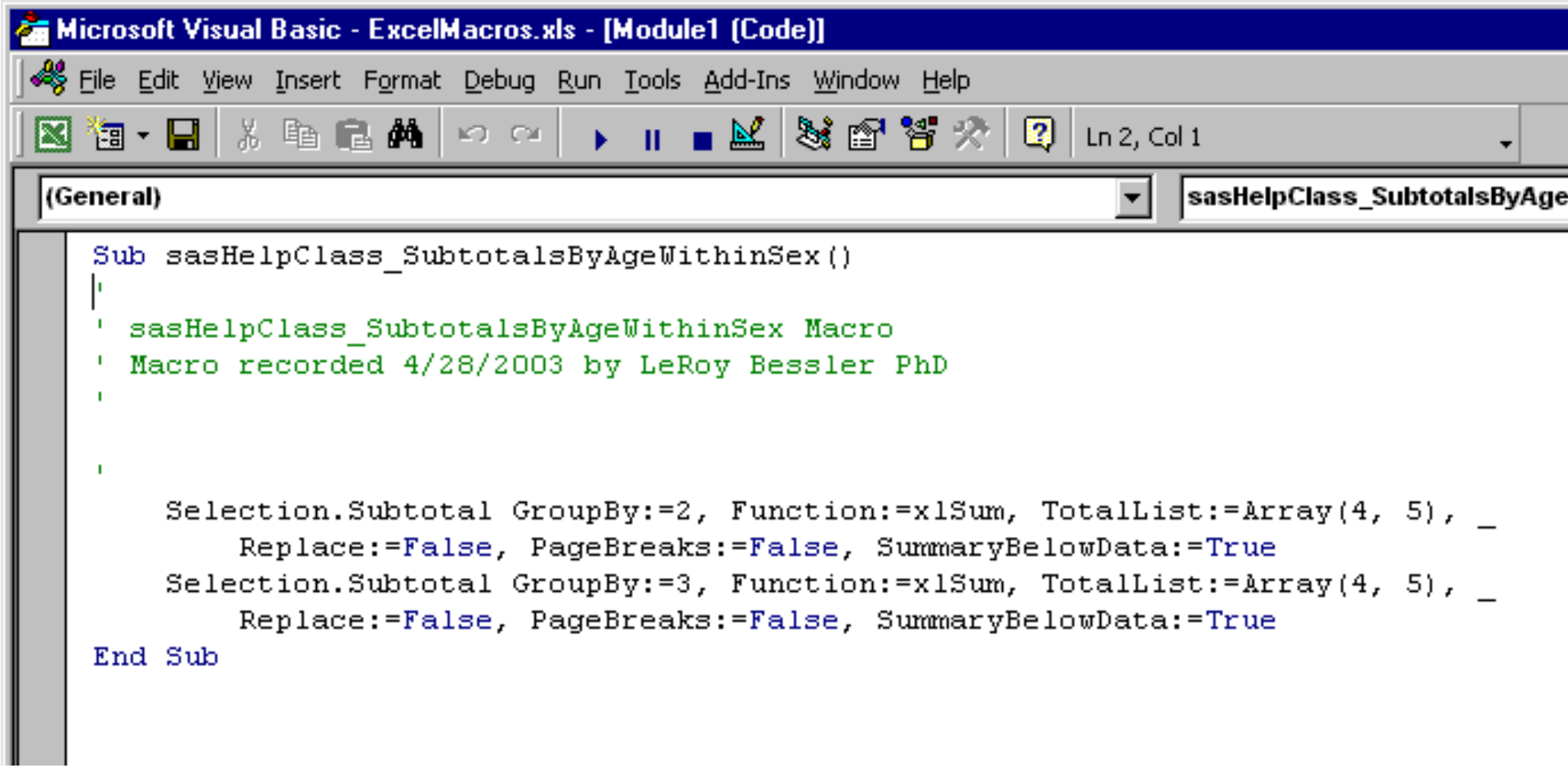
Only Excel Macros Here



Open Macro for Demo Only



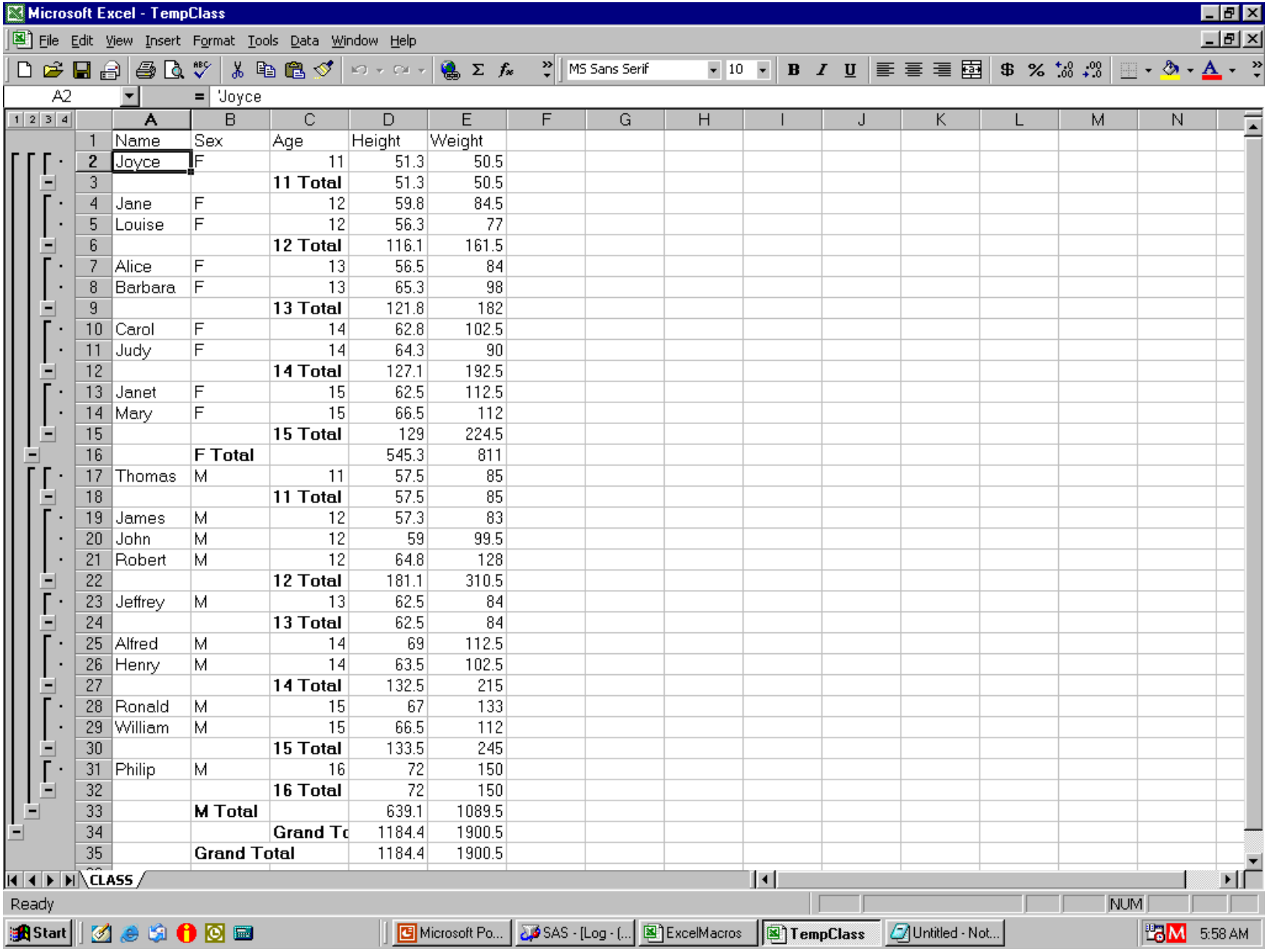
Open Macro for Demo Only



Open Data Workbook, Run the Subtotals Excel Macro

```
data _null_;
file DDEcmds;
put '[open("C:\Folder\TempClass.xls")]';
x=sleep(3);
put '[run("ExcelMacros.xls!DoSubtotals",false)]';
run;
```

Subtotals, but Grand Totals Twice!



	A	B	C	D	E
1	Name	Sex	Age	Height	Weight
2	Joyce	F	11	51.3	50.5
3			**11 Total**	51.3	50.5
4	Jane	F	12	59.8	84.5
5	Louise	F	12	56.3	77
6			**12 Total**	116.1	161.5
7	Alice	F	13	56.5	84
8	Barbara	F	13	65.3	98
9			**13 Total**	121.8	182
10	Carol	F	14	62.8	102.5
11	Judy	F	14	64.3	90
12			**14 Total**	127.1	192.5
13	Janet	F	15	62.5	112.5
14	Mary	F	15	66.5	112
15			**15 Total**	129	224.5
16		**F Total**		545.3	811
17	Thomas	M	11	57.5	85
18			**11 Total**	57.5	85
19	James	M	12	57.3	83
20	John	M	12	59	99.5
21	Robert	M	12	64.8	128
22			**12 Total**	181.1	310.5
23	Jeffrey	M	13	62.5	84
24			**13 Total**	62.5	84
25	Alfred	M	14	69	112.5
26	Henry	M	14	63.5	102.5
27			**14 Total**	132.5	215
28	Ronald	M	15	67	133
29	William	M	15	66.5	112
30			**15 Total**	133.5	245
31	Philip	M	16	72	150
32			**16 Total**	72	150
33		**M Total**		639.1	1089.5
34			**Grand To**	1184.4	1900.5
35		**Grand Total**		1184.4	1900.5

Removing the Extra Grand Total

Subtotals, but Grand Totals Twice!

29	William	M	15	66.5	112
30			**15 Total**	133.5	245
31	Philip	M	16	72	150
32			**16 Total**	72	150
33		**M Total**		639.1	1089.5
34			**Grand To**	1184.4	1900.5
35		**Grand Total**		1184.4	1900.5

CLASS

Ready

Reformat & Save

```
data _null_;
file DDEcmds;
put '[select("R1")]';
put '[font.properties("","Bold")]';
put '[select("C1:C5")]';
put '[column.width(,,,3)]';
put '[error(false)]';
put
'[save.as("C:\Folder\DataWithSubtotals.xls")]';
x=sleep(1); run;
```

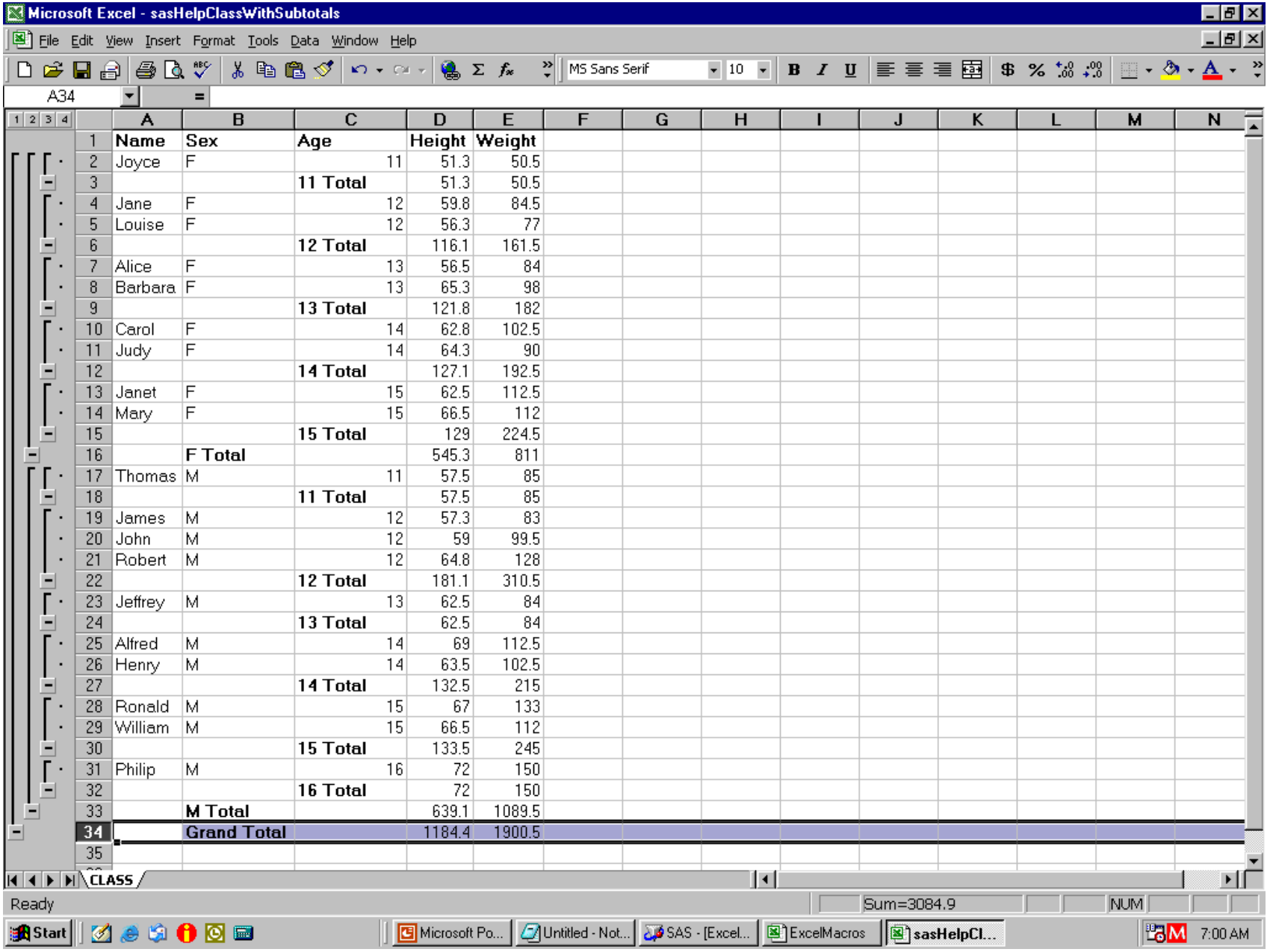
Remove Extra Grand Total, Part 1: Find Second from Last Row & Put Row Number in Symbol Table

```
filename Column DDE
  "EXCEL|CLASS!R1C1:R65536C1" notab;
data _null_;
length FirstCharInColumnCell $ 1;
infile Column truncover end=LastObs;
input FirstCharInColumnCell;
if LastObs;
call symput("RowToRemove",trim(left(_N_-1)));
run;
```

Remove Extra Grand Total, Part 2
Select Second from Last Row & Delete It

```
data _null_; file DDEcmds;
put '[select(''R' ''&RowToRemove'' '''')]';
put '[edit.delete(3)]';
run; /* resolves to: put '[select("R34")]'; */
```

Only One Grand Total



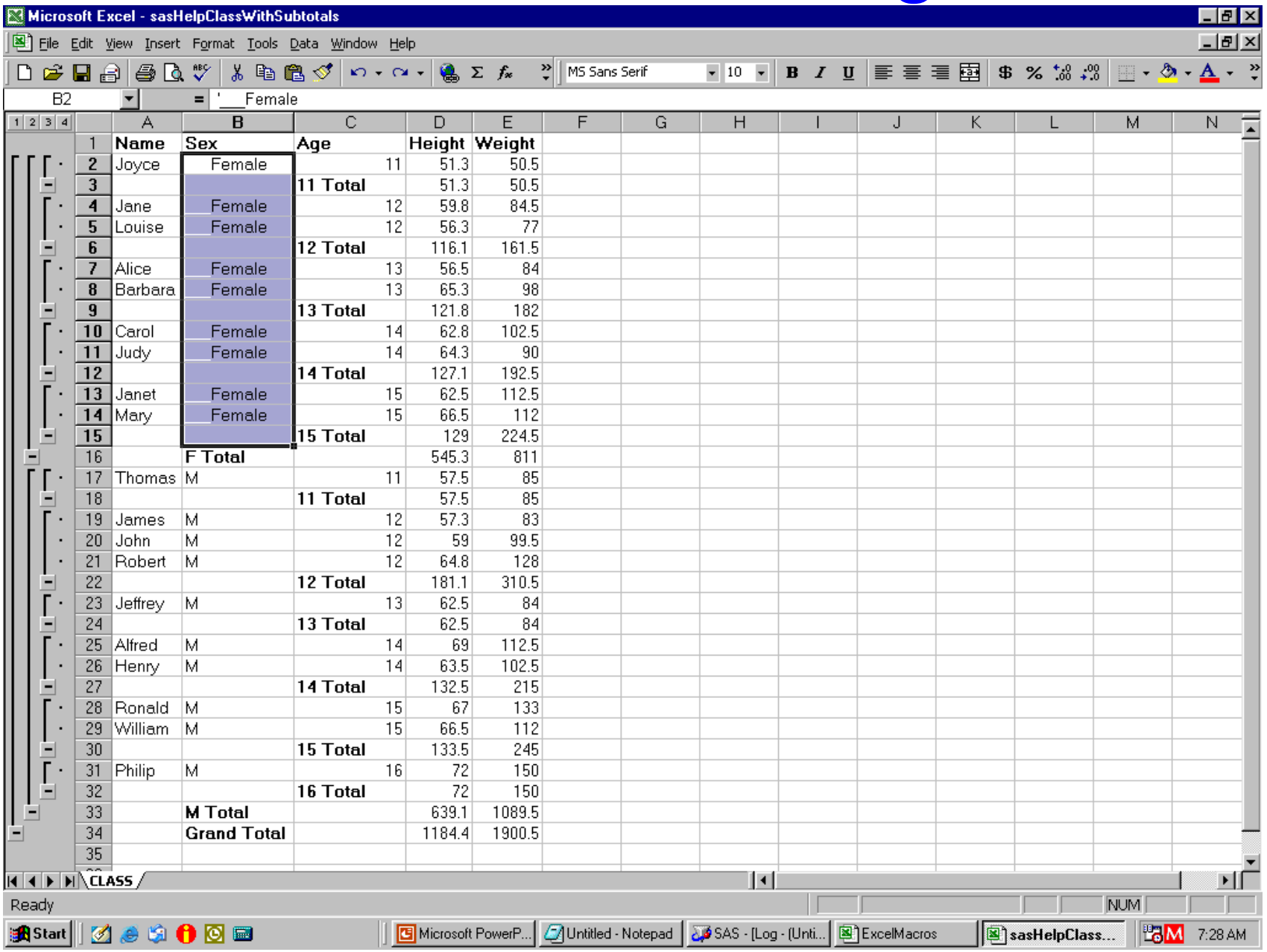
	A	B	C	D	E
1	**Name**	**Sex**	**Age**	**Height**	**Weight**
2	Joyce	F	11	51.3	50.5
3			**11 Total**	51.3	50.5
4	Jane	F	12	59.8	84.5
5	Louise	F	12	56.3	77
6			**12 Total**	116.1	161.5
7	Alice	F	13	56.5	84
8	Barbara	F	13	65.3	98
9			**13 Total**	121.8	182
10	Carol	F	14	62.8	102.5
11	Judy	F	14	64.3	90
12			**14 Total**	127.1	192.5
13	Janet	F	15	62.5	112.5
14	Mary	F	15	66.5	112
15			**15 Total**	129	224.5
16		**F Total**		545.3	811
17	Thomas	M	11	57.5	85
18			**11 Total**	57.5	85
19	James	M	12	57.3	83
20	John	M	12	59	99.5
21	Robert	M	12	64.8	128
22			**12 Total**	181.1	310.5
23	Jeffrey	M	13	62.5	84
24			**13 Total**	62.5	84
25	Alfred	M	14	69	112.5
26	Henry	M	14	63.5	102.5
27			**14 Total**	132.5	215
28	Ronald	M	15	67	133
29	William	M	15	66.5	112
30			**15 Total**	133.5	245
31	Philip	M	16	72	150
32			**16 Total**	72	150
33		**M Total**		639.1	1089.5
34		**Grand Total**		1184.4	1900.5
35					

Changing & Indenting Values
Changing Excel Subtotal Labels

Pseudo-Indent Cell Content

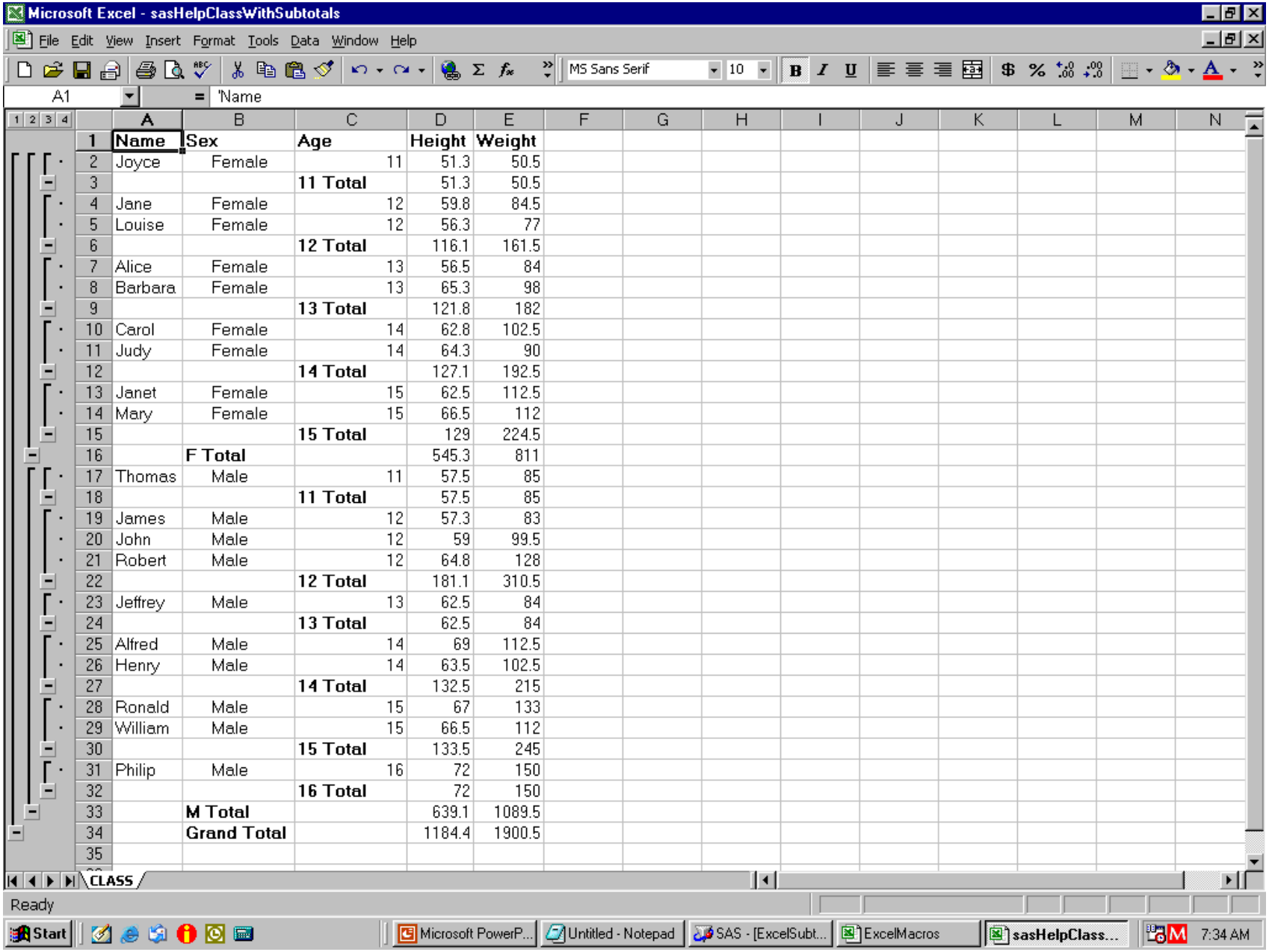
```
data _null_;
file DDEcmds;
put '[select("R2C2:R15C2")]';
put
'[formula.replace("F","___Female",1,,false,false)]';
  /* change color of three _ to White
     to match cell background color: */
put '[font.properties(,,,,,,,,,2,,,1,3)]';
run; /* 2 = White , StartAt = 1, ForLengthOf = 3 */
```

Indent Work In Progress



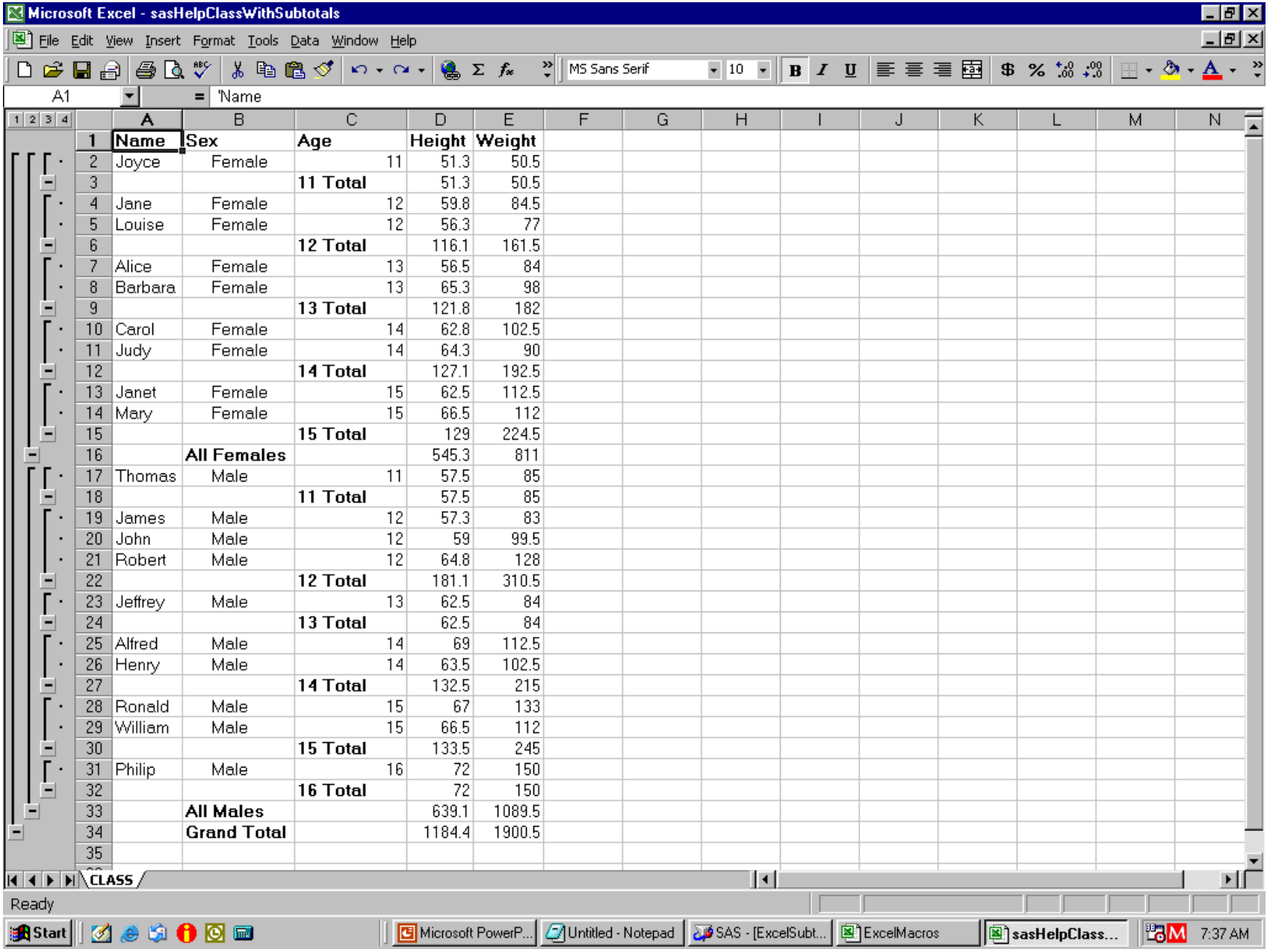
	A	B	C	D	E
1	**Name**	**Sex**	**Age**	**Height**	**Weight**
2	Joyce	Female	11	51.3	50.5
3			**11 Total**	51.3	50.5
4	Jane	Female	12	59.8	84.5
5	Louise	Female	12	56.3	77
6			**12 Total**	116.1	161.5
7	Alice	Female	13	56.5	84
8	Barbara	Female	13	65.3	98
9			**13 Total**	121.8	182
10	Carol	Female	14	62.8	102.5
11	Judy	Female	14	64.3	90
12			**14 Total**	127.1	192.5
13	Janet	Female	15	62.5	112.5
14	Mary	Female	15	66.5	112
15			**15 Total**	129	224.5
16		**F Total**		545.3	811
17	Thomas	M	11	57.5	85
18			**11 Total**	57.5	85
19	James	M	12	57.3	83
20	John	M	12	59	99.5
21	Robert	M	12	64.8	128
22			**12 Total**	181.1	310.5
23	Jeffrey	M	13	62.5	84
24			**13 Total**	62.5	84
25	Alfred	M	14	69	112.5
26	Henry	M	14	63.5	102.5
27			**14 Total**	132.5	215
28	Ronald	M	15	67	133
29	William	M	15	66.5	112
30			**15 Total**	133.5	245
31	Philip	M	16	72	150
32			**16 Total**	72	150
33		**M Total**		639.1	1089.5
34		**Grand Total**		1184.4	1900.5
35					

Indents Complete



	A	B	C	D	E
1	**Name**	**Sex**	**Age**	**Height**	**Weight**
2	Joyce	Female	11	51.3	50.5
3			**11 Total**	51.3	50.5
4	Jane	Female	12	59.8	84.5
5	Louise	Female	12	56.3	77
6			**12 Total**	116.1	161.5
7	Alice	Female	13	56.5	84
8	Barbara	Female	13	65.3	98
9			**13 Total**	121.8	182
10	Carol	Female	14	62.8	102.5
11	Judy	Female	14	64.3	90
12			**14 Total**	127.1	192.5
13	Janet	Female	15	62.5	112.5
14	Mary	Female	15	66.5	112
15			**15 Total**	129	224.5
16		**F Total**		545.3	811
17	Thomas	Male	11	57.5	85
18			**11 Total**	57.5	85
19	James	Male	12	57.3	83
20	John	Male	12	59	99.5
21	Robert	Male	12	64.8	128
22			**12 Total**	181.1	310.5
23	Jeffrey	Male	13	62.5	84
24			**13 Total**	62.5	84
25	Alfred	Male	14	69	112.5
26	Henry	Male	14	63.5	102.5
27			**14 Total**	132.5	215
28	Ronald	Male	15	67	133
29	William	Male	15	66.5	112
30			**15 Total**	133.5	245
31	Philip	Male	16	72	150
32			**16 Total**	72	150
33		**M Total**		639.1	1089.5
34		**Grand Total**		1184.4	1900.5
35					

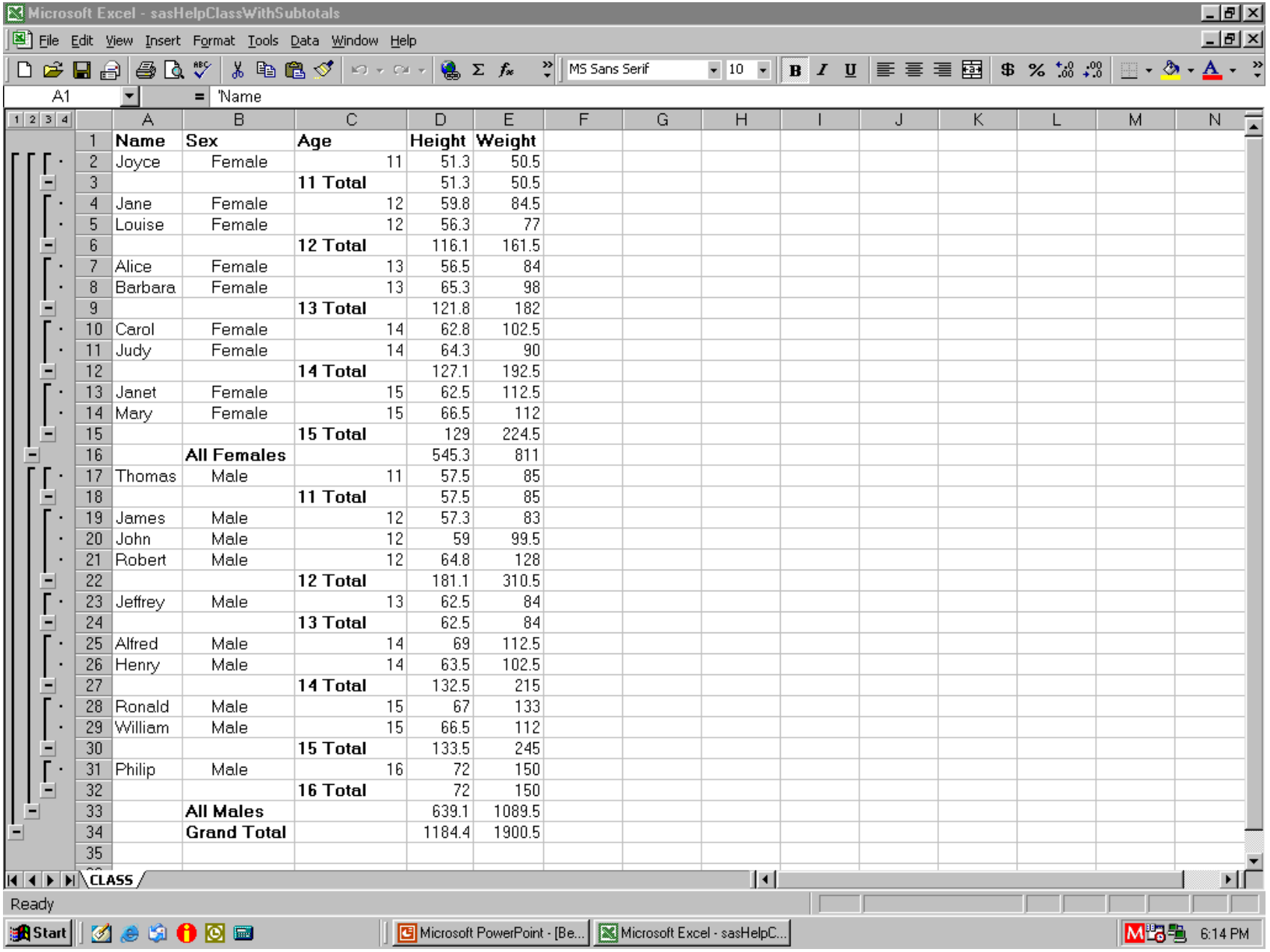
New Labels for Sex Subtotals



	A	B	C	D	E
1	Name	Sex	Age	Height	Weight
2	Joyce	Female	11	51.3	50.5
3			11 Total	51.3	50.5
4	Jane	Female	12	59.8	84.5
5	Louise	Female	12	56.3	77
6			12 Total	116.1	161.5
7	Alice	Female	13	56.5	84
8	Barbara	Female	13	65.3	98
9			13 Total	121.8	182
10	Carol	Female	14	62.8	102.5
11	Judy	Female	14	64.3	90
12			14 Total	127.1	192.5
13	Janet	Female	15	62.5	112.5
14	Mary	Female	15	66.5	112
15			15 Total	129	224.5
16		All Females		545.3	811
17	Thomas	Male	11	57.5	85
18			11 Total	57.5	85
19	James	Male	12	57.3	83
20	John	Male	12	59	99.5
21	Robert	Male	12	64.8	128
22			12 Total	181.1	310.5
23	Jeffrey	Male	13	62.5	84
24			13 Total	62.5	84
25	Alfred	Male	14	69	112.5
26	Henry	Male	14	63.5	102.5
27			14 Total	132.5	215
28	Ronald	Male	15	67	133
29	William	Male	15	66.5	112
30			15 Total	133.5	245
31	Philip	Male	16	72	150
32			16 Total	72	150
33		All Males		639.1	1089.5
34		Grand Total		1184.4	1900.5
35					

Controlling Subtotal Display

Excel Subtotals, Showing to Level 4

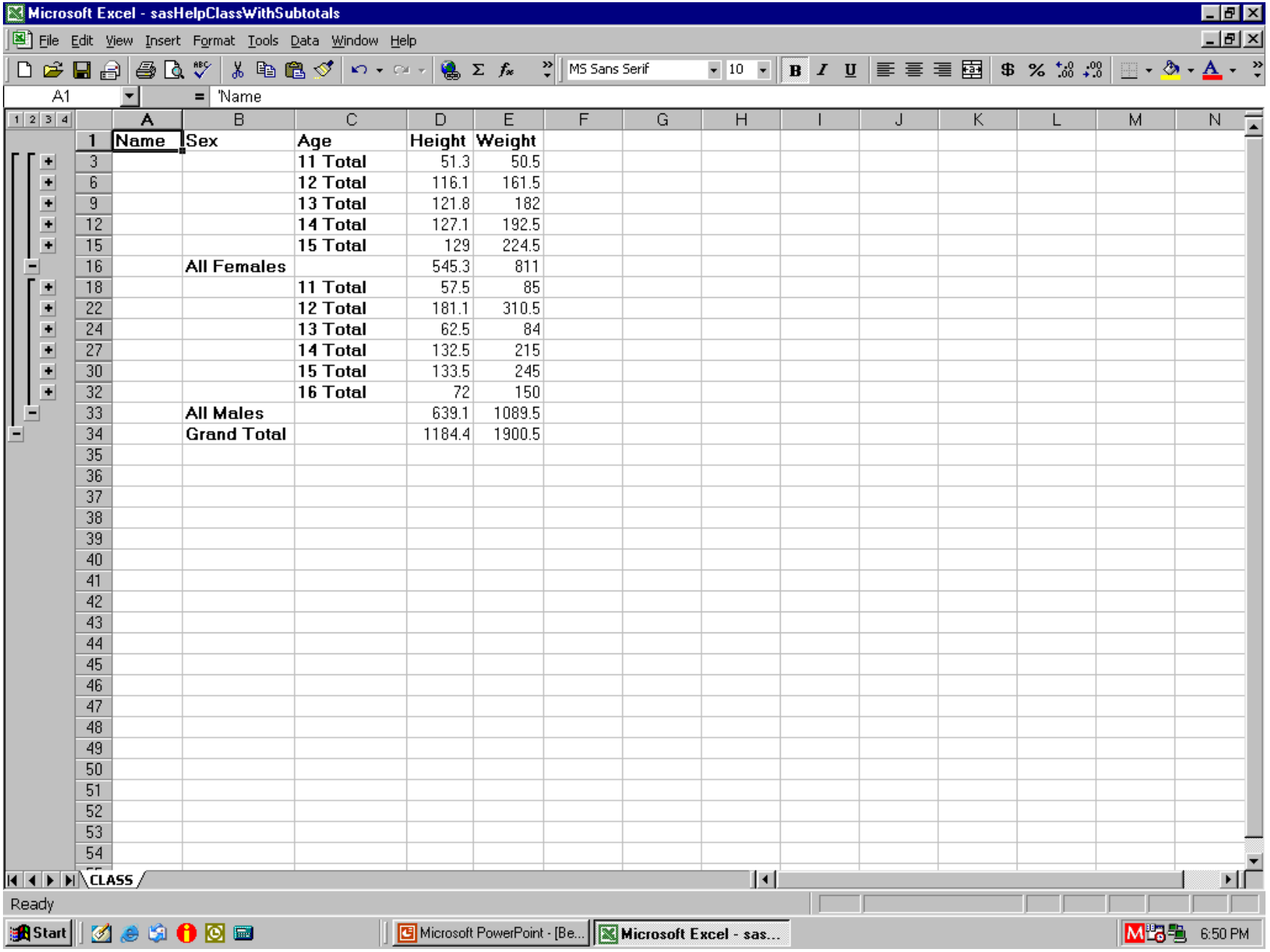


	A	B	C	D	E
1	**Name**	**Sex**	**Age**	**Height**	**Weight**
2	Joyce	Female	11	51.3	50.5
3			**11 Total**	51.3	50.5
4	Jane	Female	12	59.8	84.5
5	Louise	Female	12	56.3	77
6			**12 Total**	116.1	161.5
7	Alice	Female	13	56.5	84
8	Barbara	Female	13	65.3	98
9			**13 Total**	121.8	182
10	Carol	Female	14	62.8	102.5
11	Judy	Female	14	64.3	90
12			**14 Total**	127.1	192.5
13	Janet	Female	15	62.5	112.5
14	Mary	Female	15	66.5	112
15			**15 Total**	129	224.5
16		**All Females**		545.3	811
17	Thomas	Male	11	57.5	85
18			**11 Total**	57.5	85
19	James	Male	12	57.3	83
20	John	Male	12	59	99.5
21	Robert	Male	12	64.8	128
22			**12 Total**	181.1	310.5
23	Jeffrey	Male	13	62.5	84
24			**13 Total**	62.5	84
25	Alfred	Male	14	69	112.5
26	Henry	Male	14	63.5	102.5
27			**14 Total**	132.5	215
28	Ronald	Male	15	67	133
29	William	Male	15	66.5	112
30			**15 Total**	133.5	245
31	Philip	Male	16	72	150
32			**16 Total**	72	150
33		**All Males**		639.1	1089.5
34		**Grand Total**		1184.4	1900.5
35					

Show Subtotals Only to Level 3

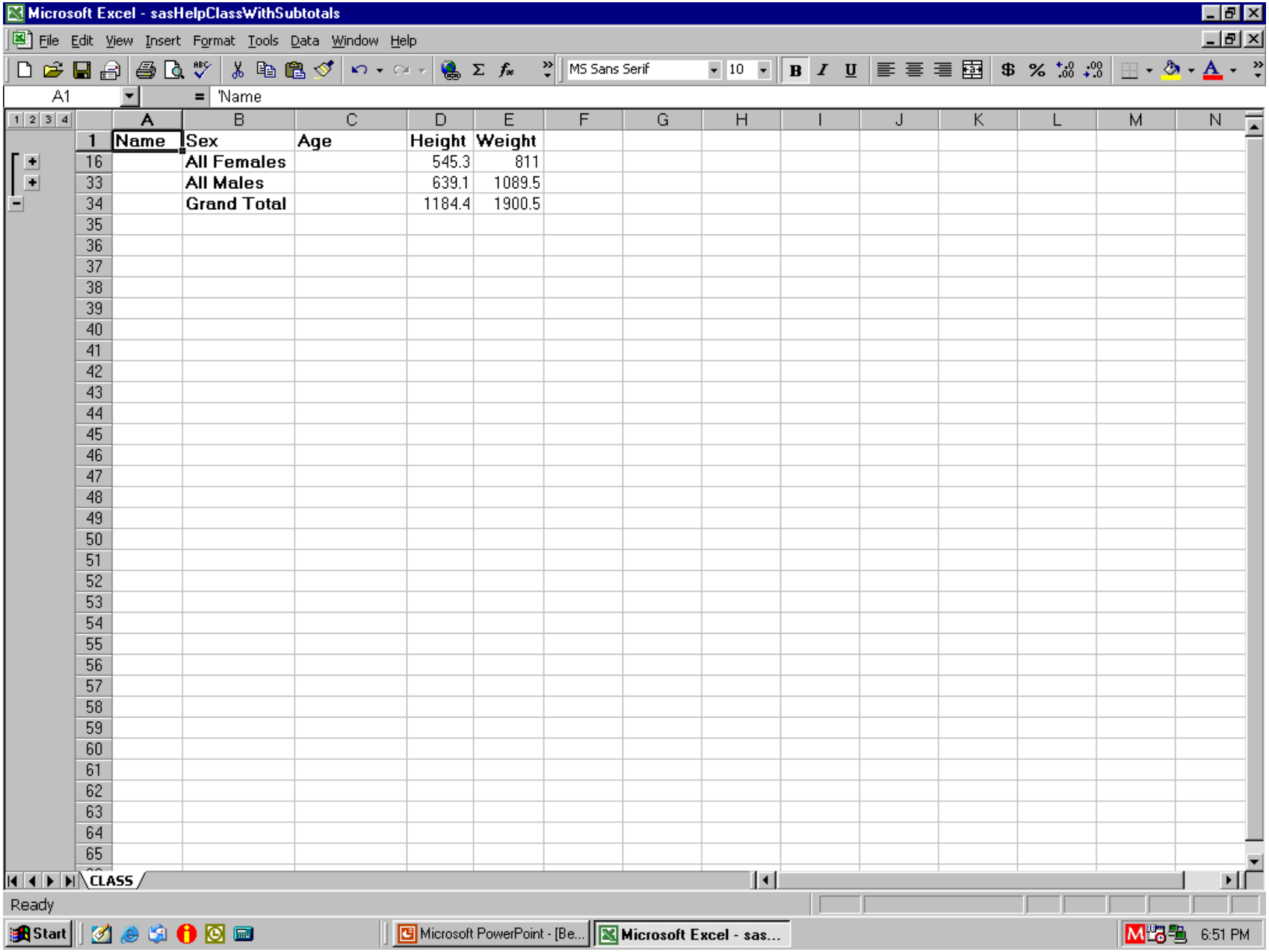
```
data _null_;
file DDEcmds;
put '[show.levels(3,0)]';
run;
```

Excel Subtotals, Showing to Level 3

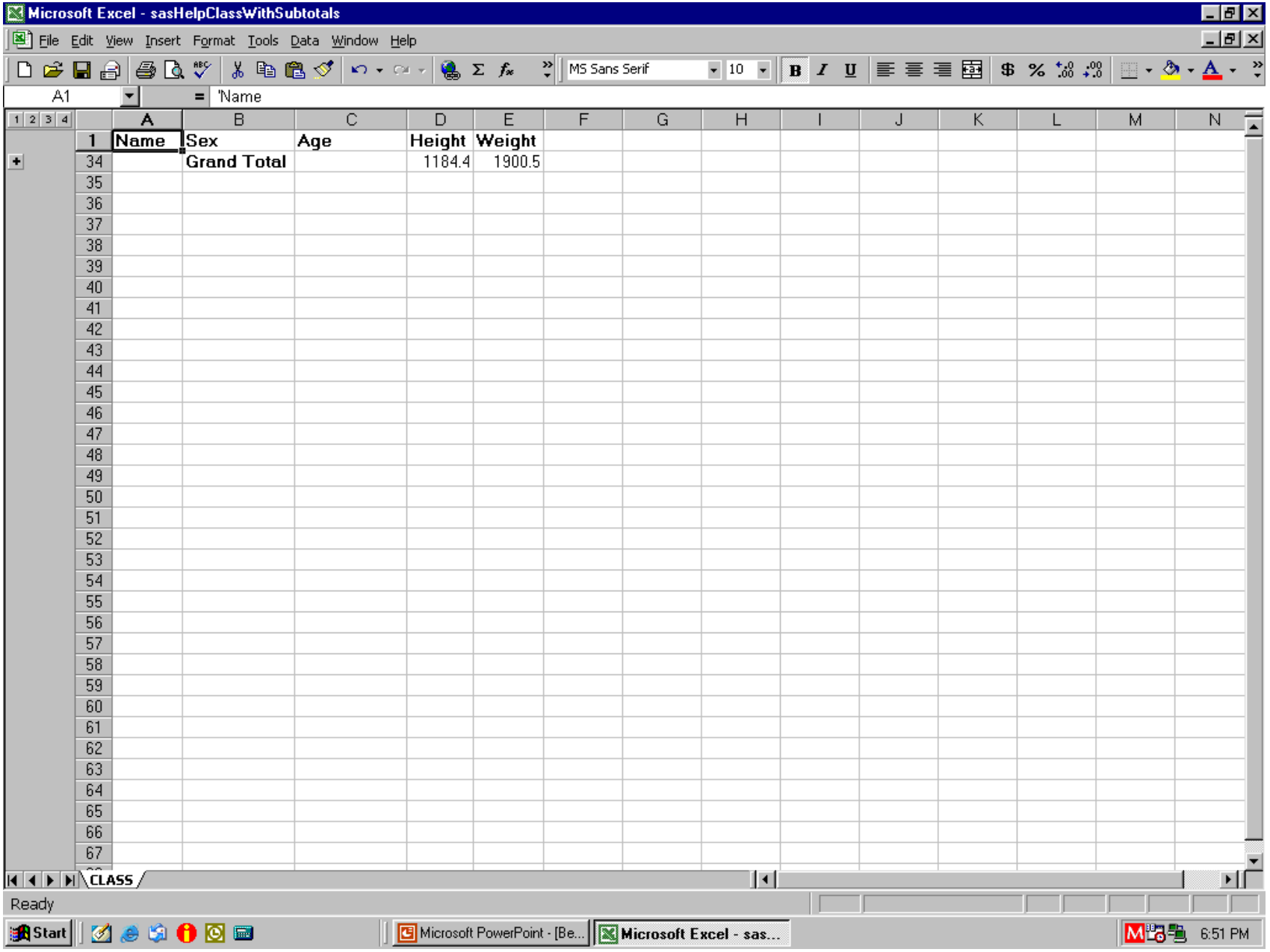


	A	B	C	D	E
1	Name	Sex	Age	Height	Weight
3			11 Total	51.3	50.5
6			12 Total	116.1	161.5
9			13 Total	121.8	182
12			14 Total	127.1	192.5
15			15 Total	129	224.5
16		All Females		545.3	811
18			11 Total	57.5	85
22			12 Total	181.1	310.5
24			13 Total	62.5	84
27			14 Total	132.5	215
30			15 Total	133.5	245
32			16 Total	72	150
33		All Males		639.1	1089.5
34		Grand Total		1184.4	1900.5

Excel Subtotals, Showing to Level 2



Excel Subtotals, Showing to Level 1



When DDE seems incapable,
you can use it to send keystrokes

For Your Suggestions, Comments, Questions, etc., or To Request the Sample Programs & Macros

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