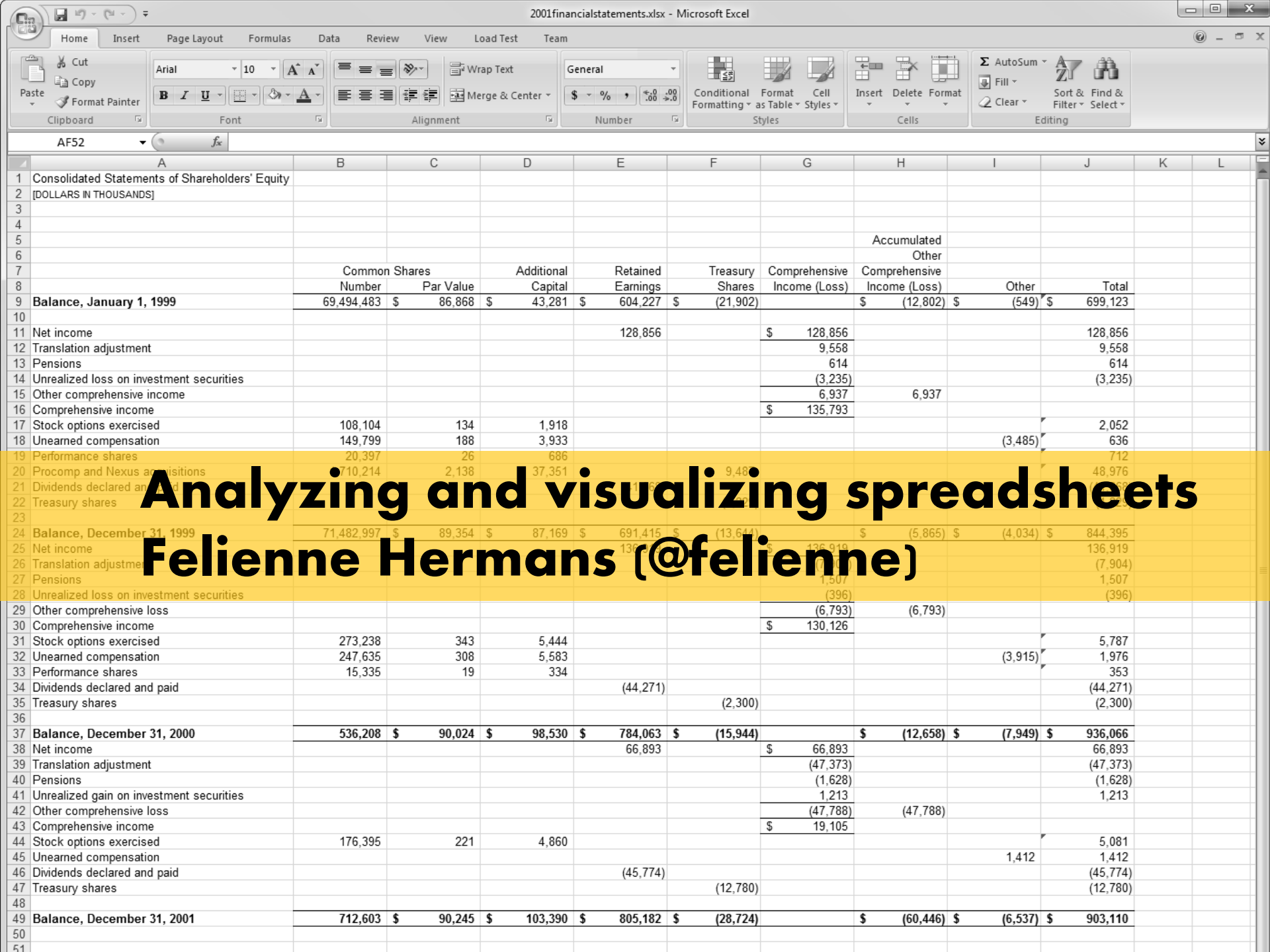
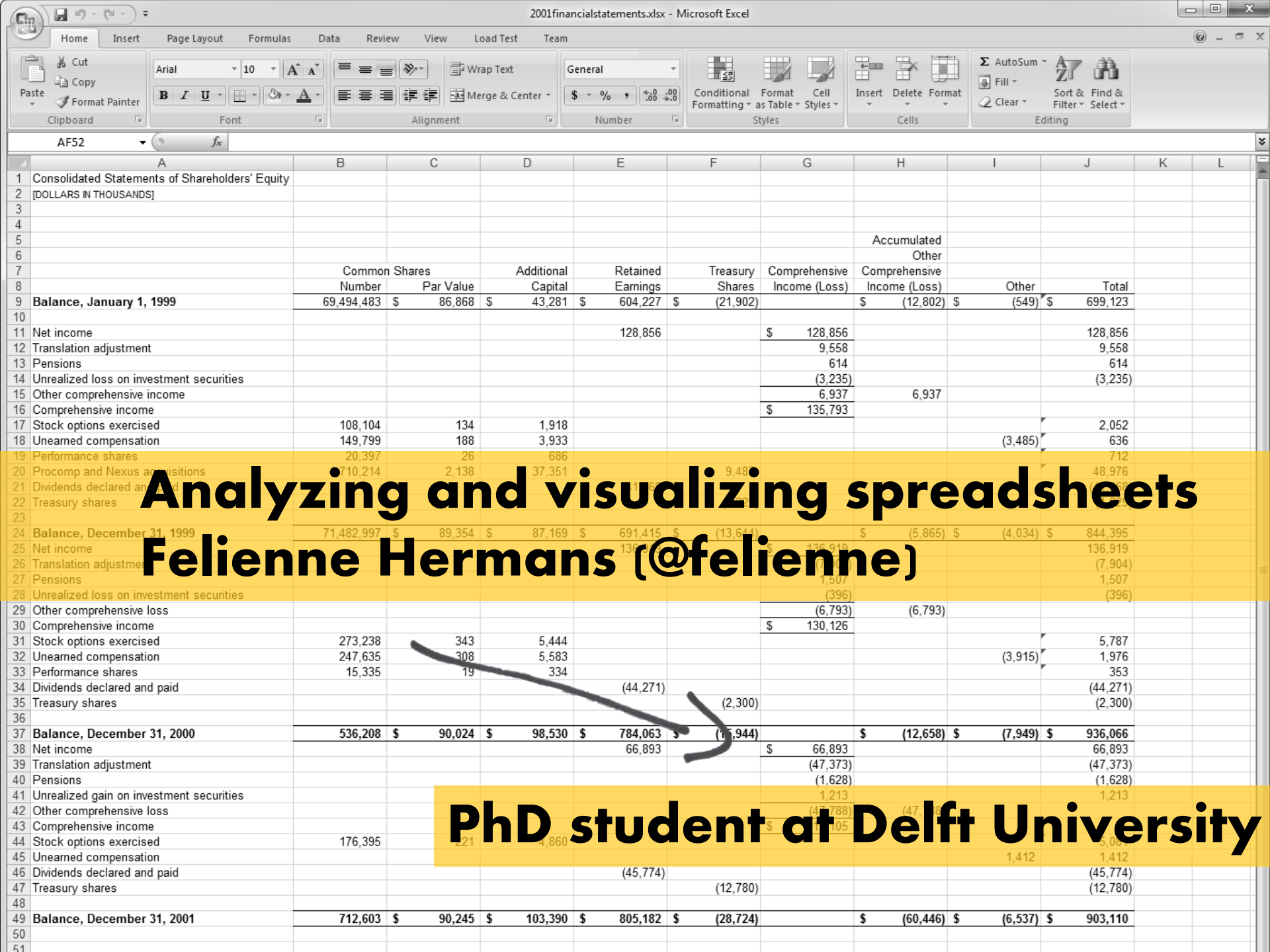


Analyzing and visualizing spreadsheets

Felienne Hermans (@felienne)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General
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Conditional Formatting
Format as Table
Cell Styles
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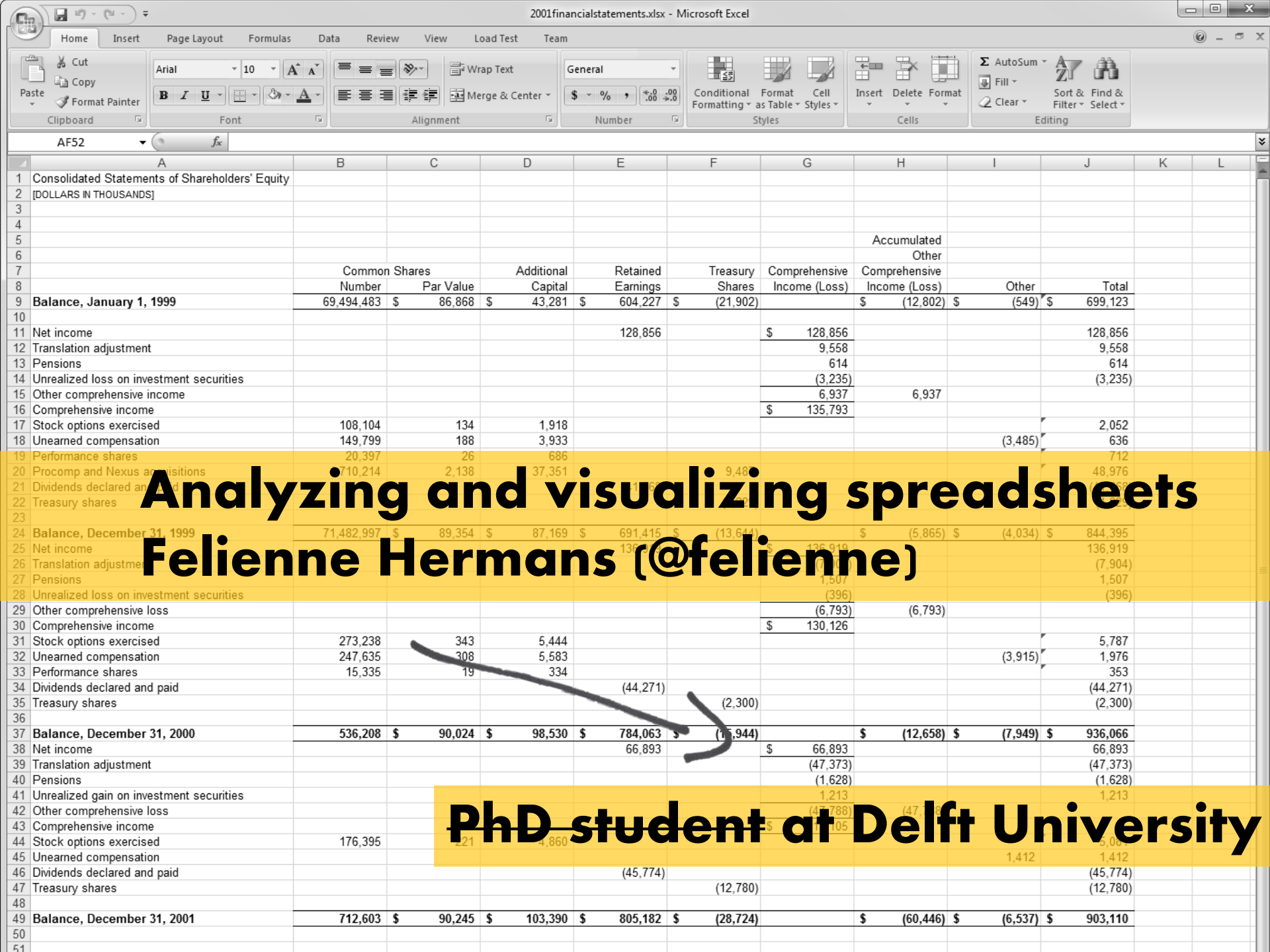
Insert
Delete
Format
Cells
AutoSum
Fill
Clear
Sort & Filter
Find & Select
Editing
AF52
Consolidated Statements of Shareholders' Equity
[DOLLARS IN THOUSANDS]
Common Shares
Number
Par Value
Additional Capital
Retained Earnings
Treasury Shares
Comprehensive Income (Loss)
Accumulated Other Comprehensive Income (Loss)
Other
Total
Balance, January 1, 1999 69,494,483 $ 86,868 $ 43,281 $ 604,227 $ (21,902) $ (12,802) $ (549) $ 699,123
Net income 128,856 $ 128,856 128,856
Translation adjustment 9,558 9,558
Pensions 614 614
Unrealized loss on investment securities (3,235) (3,235)
Other comprehensive income 6,937 6,937
Comprehensive income $ 135,793
Stock options exercised 108,104 134 1,918 2,052
Unearned compensation 149,799 188 3,933 (3,485) 636
Performance shares 20,397 26 686 712
Procomp and Nexus acquisitions 710,214 2,138 37,351 9,48 48,976
Dividends declared and
Treasury shares
Balance, December 31, 1999 71,482,997 $ 89,354 $ 87,169 $ 691,415 $ (13,64 $ (5,865) $ (4,034) $ 844,395
Net income 136,919 $ 136,919
Translation adjustme (7,904)
Pensions 1,507 1,507
Unrealized loss on investment securities (396) (396)
Other comprehensive loss (6,793) (6,793)
Comprehensive income $ 130,126
Stock options exercised 273,238 343 5,444 5,787
Unearned compensation 247,635 308 5,583 (3,915) 1,976
Performance shares 15,335 19 334 353
Dividends declared and paid (44,271) (44,271)
Treasury shares (2,300) (2,300)
Balance, December 31, 2000 536,208 $ 90,024 $ 98,530 $ 784,063 $ (15,944) $ (12,658) $ (7,949) $ 936,066
Net income 66,893 $ 66,893 66,893
Translation adjustment (47,373) (47,373)
Pensions (1,628) (1,628)
Unrealized gain on investment securities 1,213 1,213
Other comprehensive loss (47,788) (47
Comprehensive income $ 105
Stock options exercised 176,395 221 4,860
Unearned compensation 1,412 1,412
Dividends declared and paid (45,774) (45,774)
Treasury shares (12,780) (12,780)
Balance, December 31, 2001 712,603 $ 90,245 $ 103,390 $ 805,182 $ (28,724) $ (60,446) $ (6,537) $ 903,110
Analyzing and visualizing spreadsheets
Felienne Hermans (@felienne)
PhD student at Delft University



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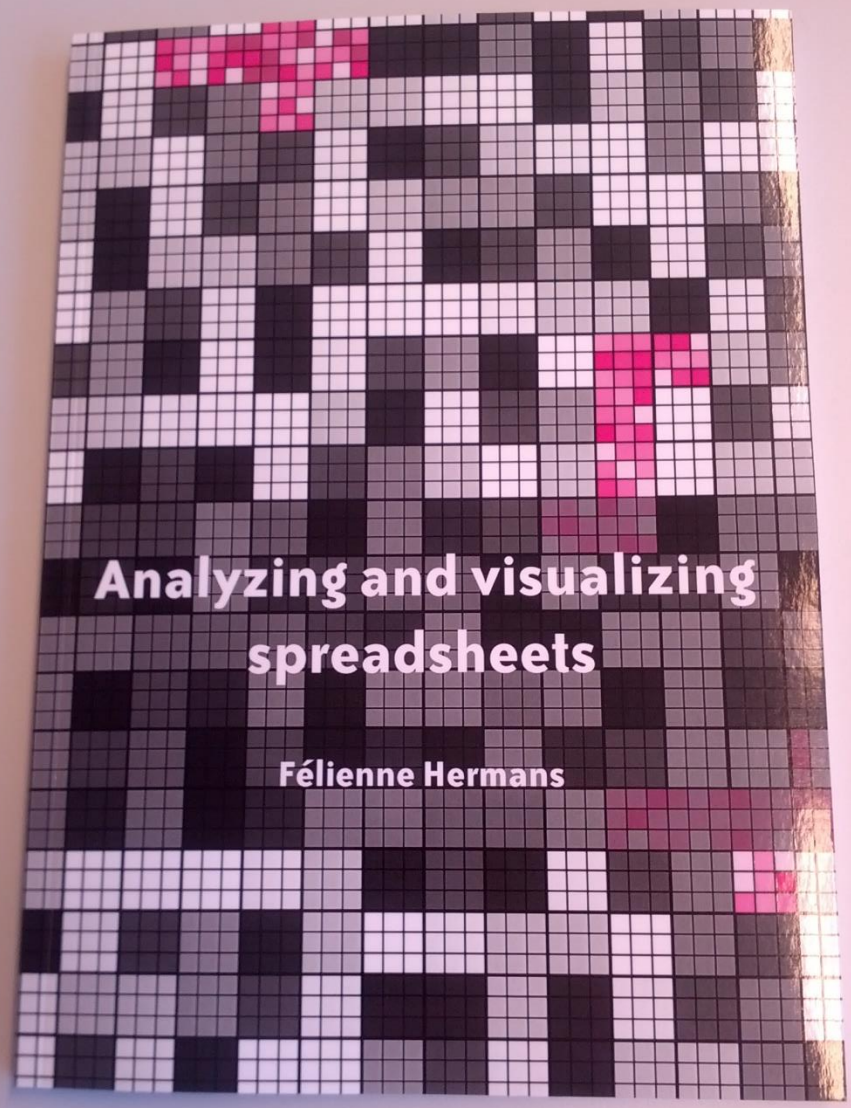
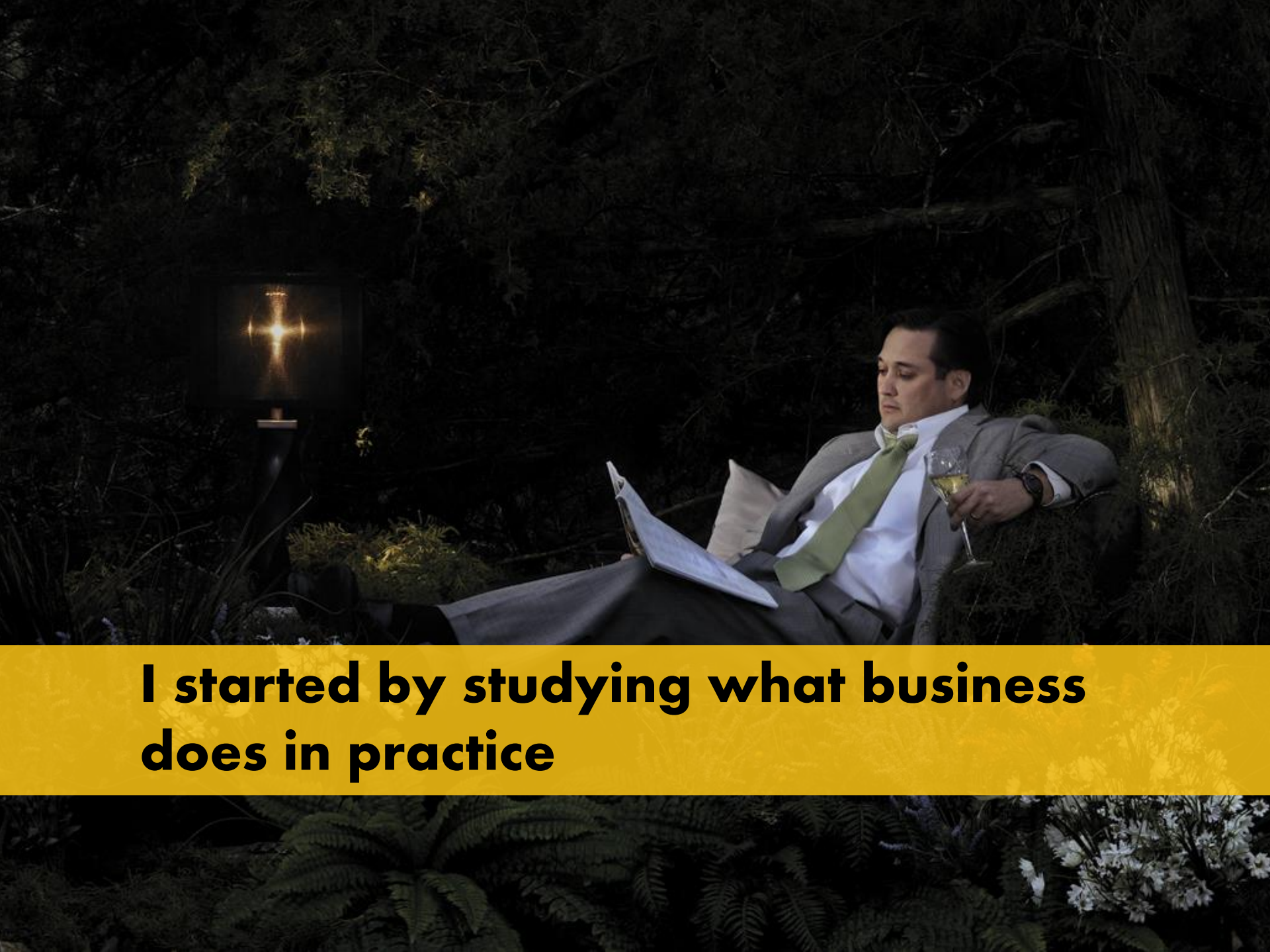

Analyzing and visualizing spreadsheets
Félienne Hermans

Bridging the gap


Users
Programmers



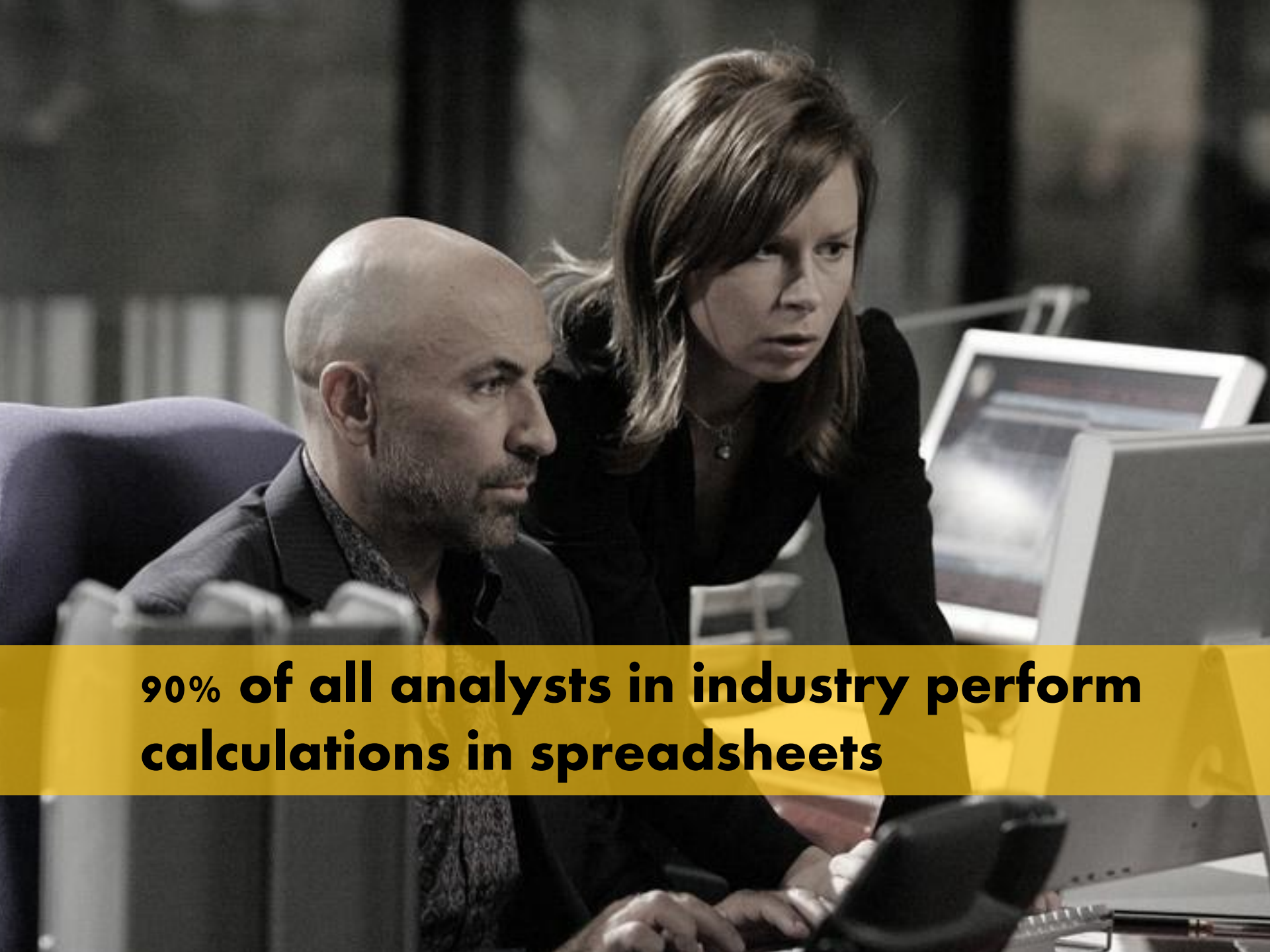
I started by studying what business does in practice

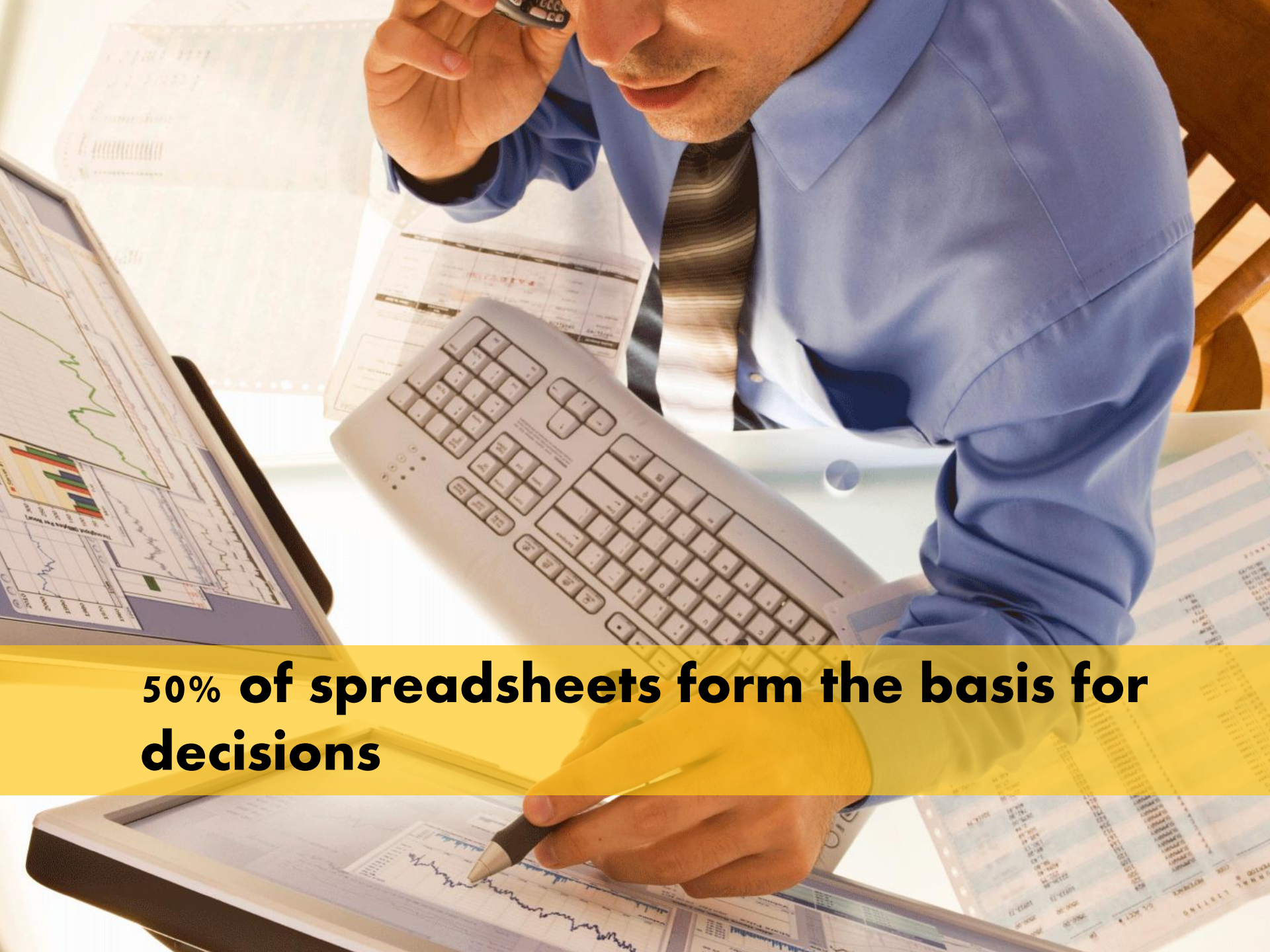
Turns out the gap is not that big


Users
Programmers


Users
Spreadsheets
Programmers


95% of all U.S. firms use spreadsheets for financial reporting

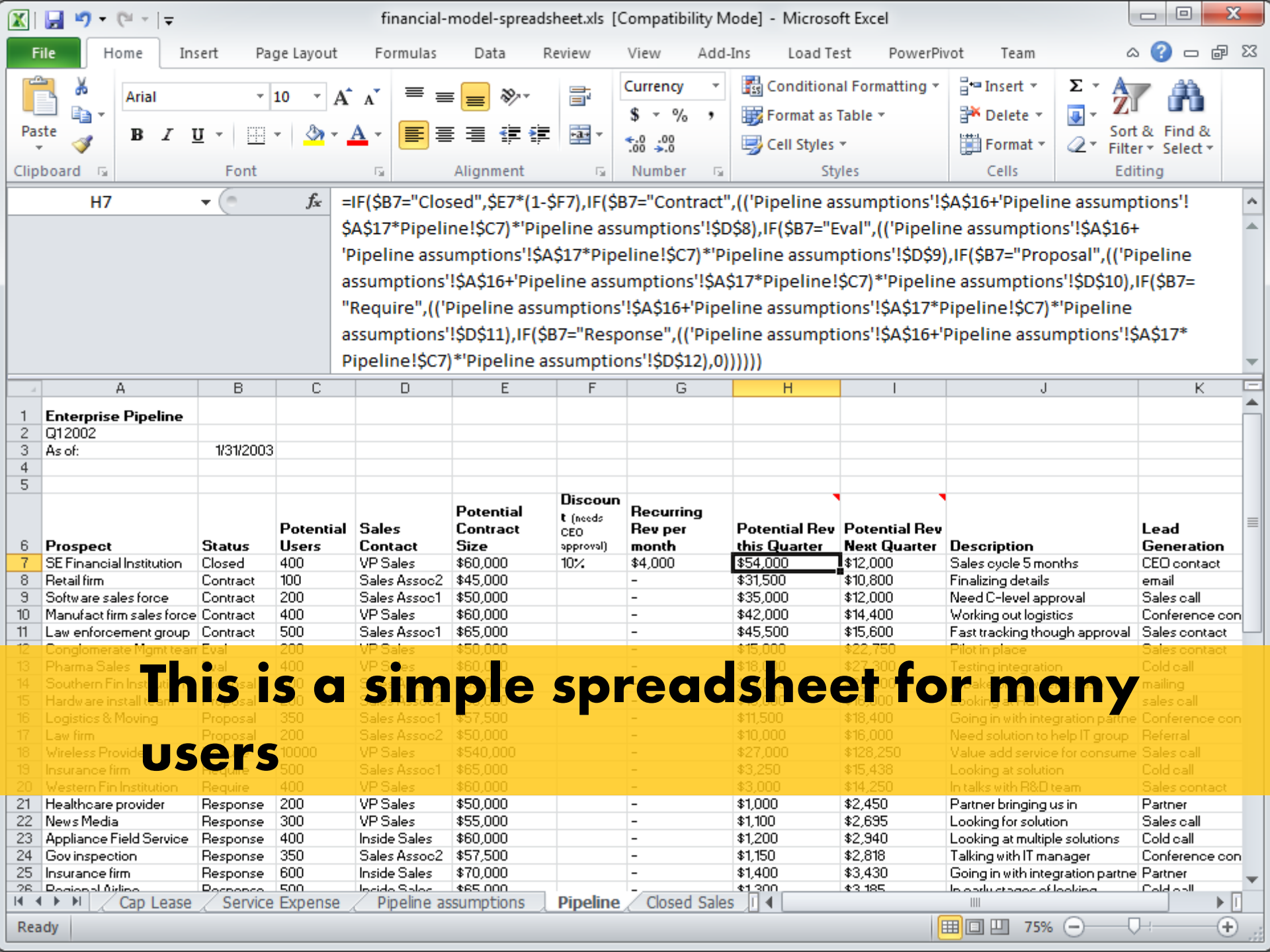

90% of all analysts in industry perform calculations in spreadsheets



50% of spreadsheets form the basis for decisions

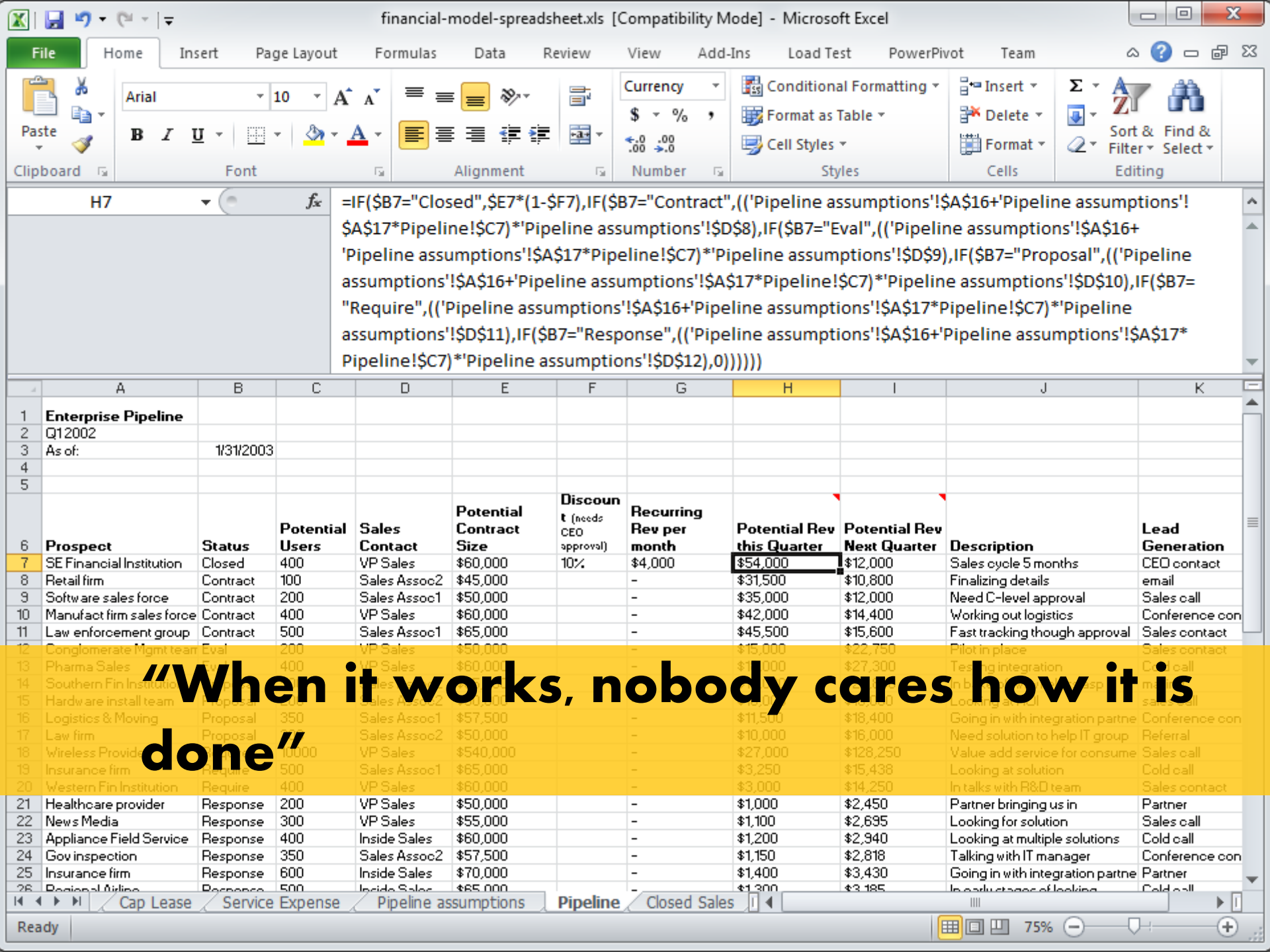
Importance can grow over time


So, they are important, but also complex!

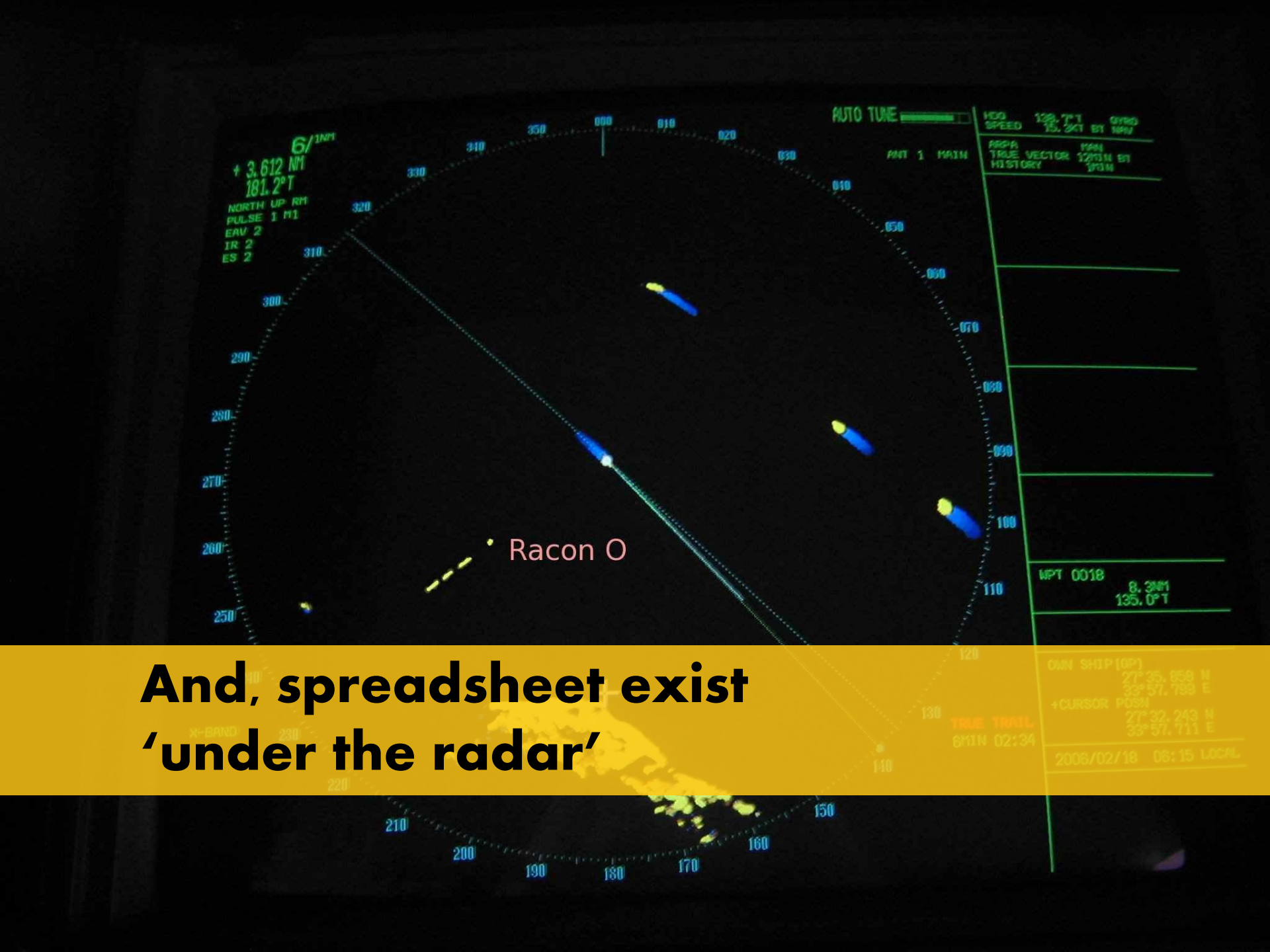


	A	B	C	D	E	F	G	H	I	J	K
1	**Enterprise Pipeline**										
2	Q1 2002										
3	As of:	1/31/2003									
4											
5											
6	**Prospect**	**Status**	**Potential Users**	**Sales Contact**	**Potential Contract Size**	**Discount (needs CEO approval)**	**Recurring Rev per month**	**Potential Rev this Quarter**	**Potential Rev Next Quarter**	**Description**	**Lead Generation**
7	SE Financial Institution	Closed	400	VP Sales	$60,000	10%	$4,000	$54,000	$12,000	Sales cycle 5 months	CEO contact
8	Retail firm	Contract	100	Sales Assoc2	$45,000		-	$31,500	$10,800	Finalizing details	email
9	Software sales force	Contract	200	Sales Assoc1	$50,000		-	$35,000	$12,000	Need C-level approval	Sales call
10	Manufact firm sales force	Contract	400	VP Sales	$60,000		-	$42,000	$14,400	Working out logistics	Conference con
11	Law enforcement group	Contract	500	Sales Assoc1	$65,000		-	$45,500	$15,600	Fast tracking though approval	Sales contact
12	Conglomerate Mgmt team	Eval	200	VP Sales	$50,000		-	$15,000	$22,750	Pilot in place	Sales contact
13	Pharma Sales	Eval	400	VP Sales	$60,000		-	$18,000	$27,300	Testing integration	Cold call
14	Southern Fin Institution	Proposal	400	VP Sales	$60,000		-	$12,000	$18,200	Take	mailing
15	Hardware install team	Proposal	200	Sales Assoc2	$50,000		-	$10,000	$15,000	Looking at RFP	sales call
16	Logistics & Moving	Proposal	350	Sales Assoc1	$57,500		-	$11,500	$18,400	Going in with integration partne	Conference con
17	Law firm	Proposal	200	Sales Assoc2	$50,000		-	$10,000	$16,000	Need solution to help IT group	Referral
18	Wireless Provider	Require	10000	VP Sales	$540,000		-	$27,000	$128,250	Value add service for consume	Sales call
19	Insurance firm	Require	500	Sales Assoc1	$65,000		-	$3,250	$15,438	Looking at solution	Cold call
20	Western Fin Institution	Require	400	VP Sales	$60,000		-	$3,000	$14,250	In talks with R&D team	Sales contact
21	Healthcare provider	Response	200	VP Sales	$50,000		-	$1,000	$2,450	Partner bringing us in	Partner
22	News Media	Response	300	VP Sales	$55,000		-	$1,100	$2,695	Looking for solution	Sales call
23	Appliance Field Service	Response	400	Inside Sales	$60,000		-	$1,200	$2,940	Looking at multiple solutions	Cold call
24	Gov inspection	Response	350	Sales Assoc2	$57,500		-	$1,150	$2,818	Talking with IT manager	Conference con
25	Insurance firm	Response	600	Inside Sales	$70,000		-	$1,400	$3,430	Going in with integration partne	Partner
26	Regional Airline	Response	500	Inside Sales	$65,000		-	$1,300	$3,185	In early stages of looking	Cold call

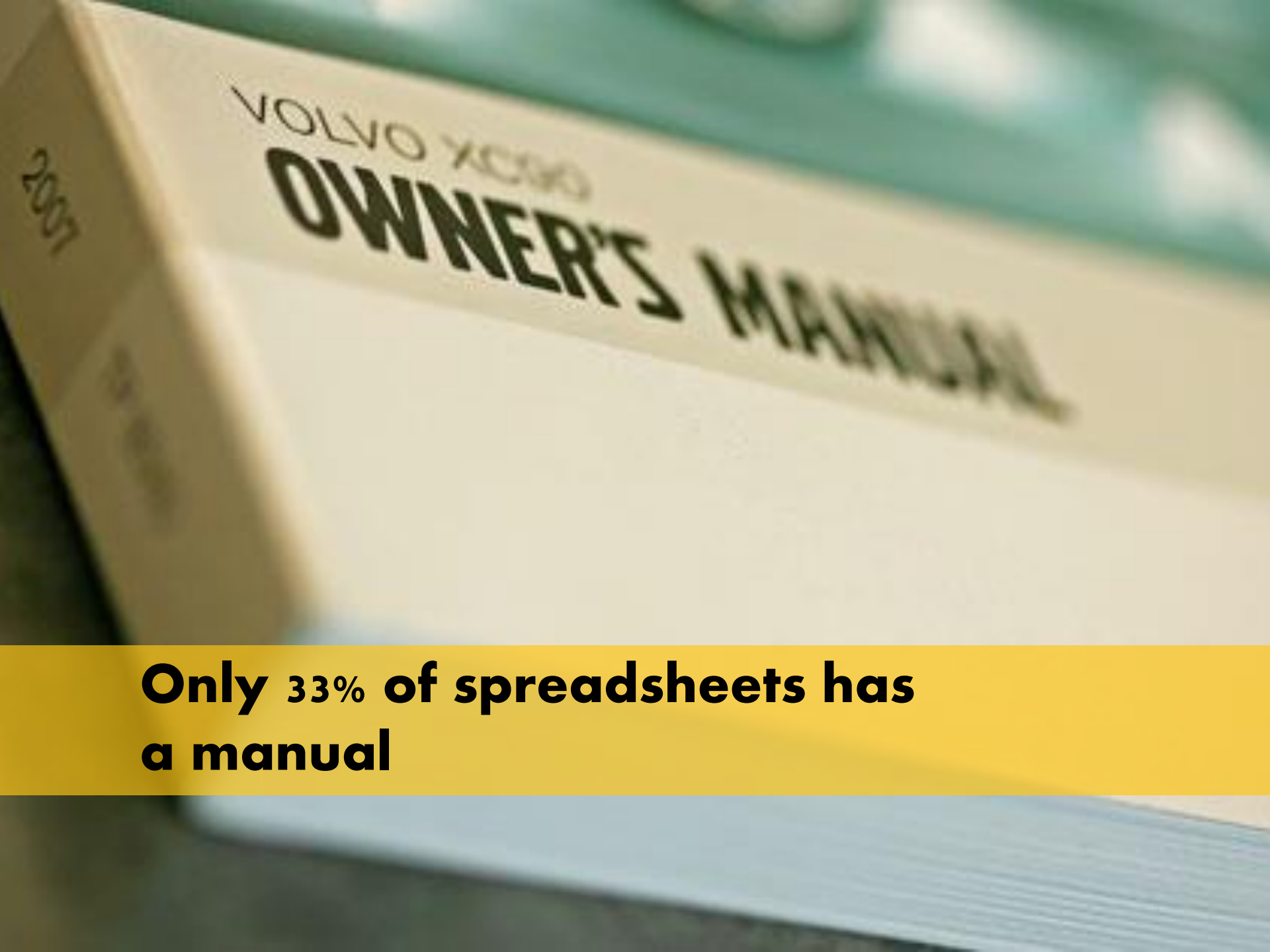
This is a simple spreadsheet for many users



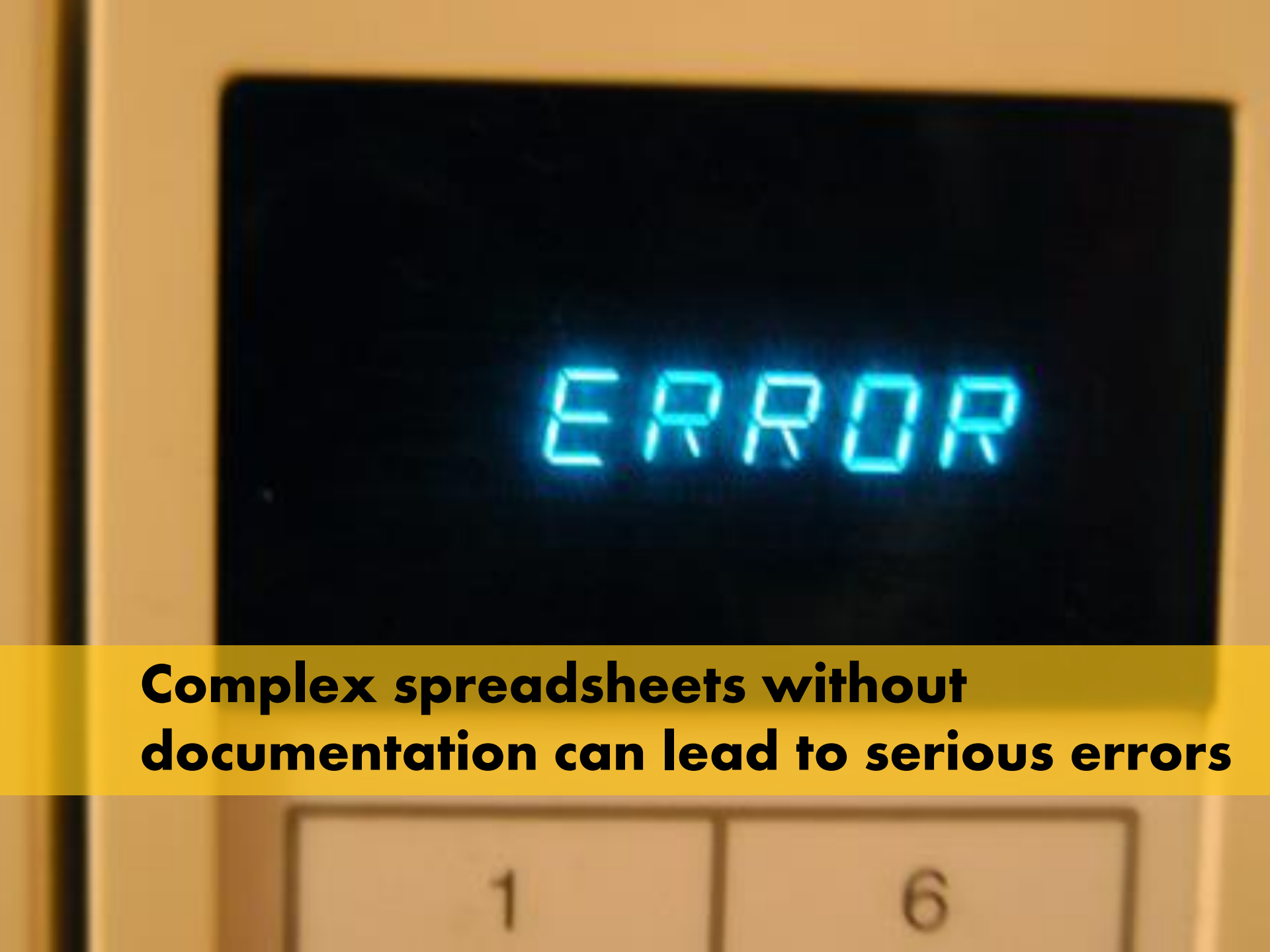
"When it works, nobody cares how it is done"



And, spreadsheet exist ‘under the radar’



Only 33% of spreadsheets has a manual



Complex spreadsheets without documentation can lead to serious errors

The European Spreadsheet Risk Interest Group (Eusprig.org) collects horror stories

AstraZeneca reaffirms outlook after mistaken release

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Mon Jan 9, 2012 9:08am GMT

LONDON - Britain's second largest drugmaker AstraZeneca (AZN.L) was forced to reiterate its 2011 and mid-term financial forecasts on Monday after inadvertently releasing confidential company information to analysts.

The Anglo-Swedish firm, which is struggling to keep pace with its European peers, described the released details as "out of date planning information" which it said did not represent its forecast for the full year for 2011 or for future periods.

"The most recent update of the company's financial guidance for 2011 was issued on 20 December 2011," it said.

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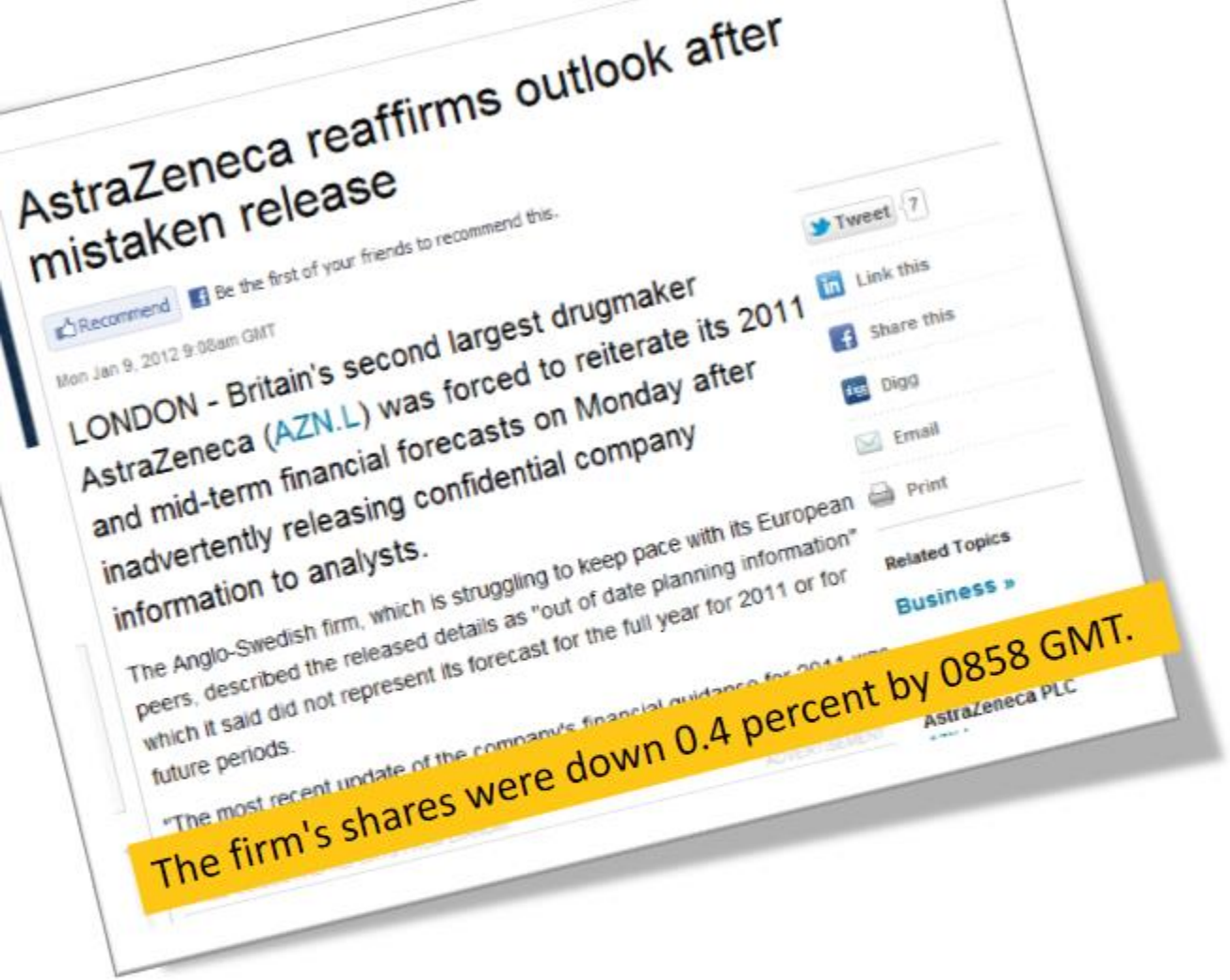
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AstraZeneca PLC
The firm's shares were down 0.4 percent by 0858 GMT.

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FREE GUIDES AND REPORTS FROM DIAMOND

The Telegraph Friday 01 June 2012

LONDON2012

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London 2012 Olympics: lucky few to get 100m final tickets after synchronised swimming was overbooked by 10,000

Around 200 people who thought their only experience of the London 2012 Olympic Games would be minor heats of synchronised swimming have received an unexpected upgrade to the men's 100m final following an embarrassing ticketing mistake.

Now you see us, now you don't: thousands of synchronised swimming ticket holders will be left disappointed

By Paul Kelso

Print this article

LONDON 2012 COUNTDOWN

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Budget discrepancies attributed to computer error

Friday, January 6, 2006
Nevada Daily Mail

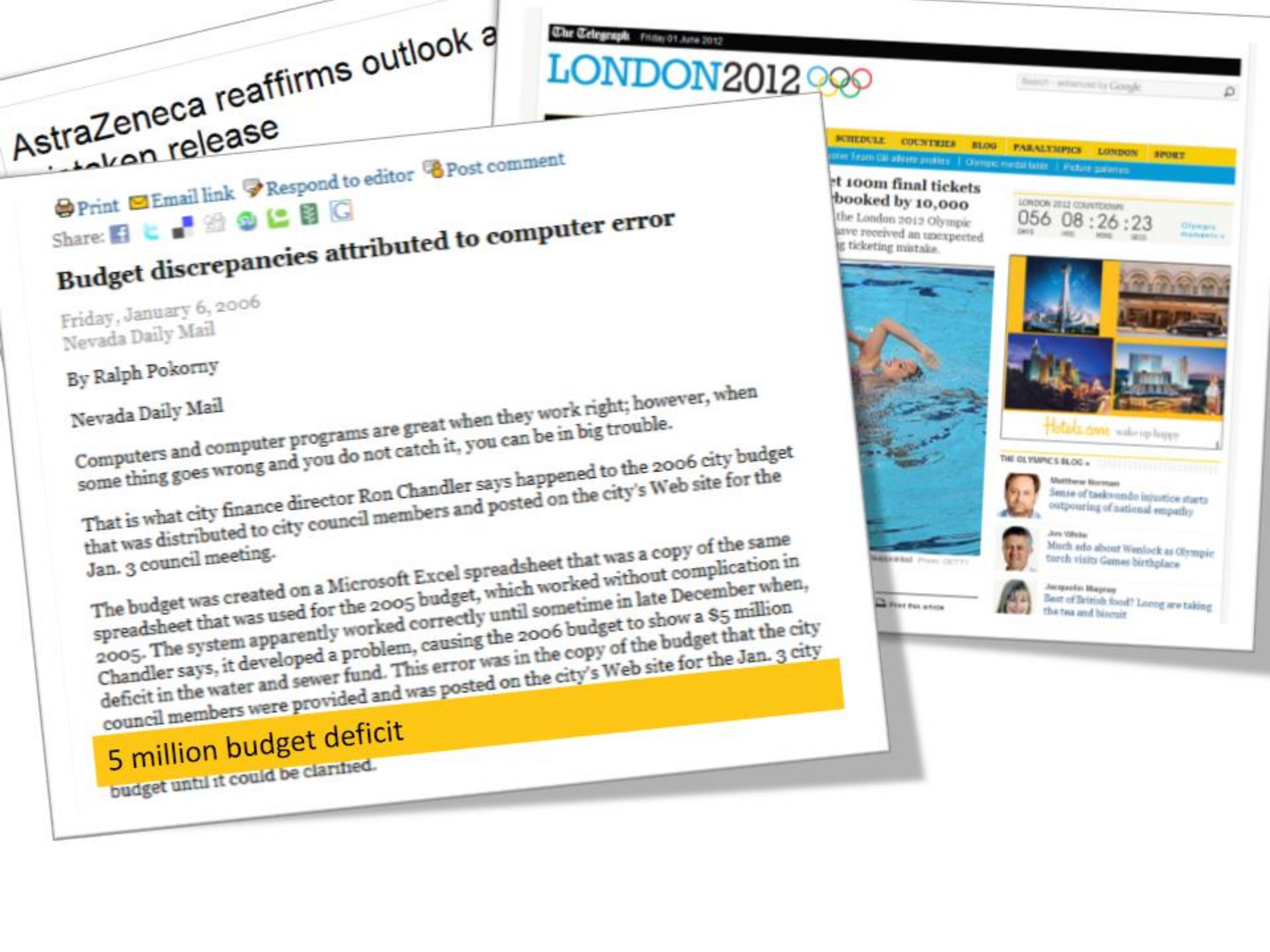
By Ralph Pokorny

Nevada Daily Mail

Computers and computer programs are great when they work right; however, when some thing goes wrong and you do not catch it, you can be in big trouble.

That is what city finance director Ron Chandler says happened to the 2006 city budget that was distributed to city council members and posted on the city's Web site for the Jan. 3 council meeting.

The budget was created on a Microsoft Excel spreadsheet that was a copy of the same spreadsheet that was used for the 2005 budget, which worked without complication in 2005. The system apparently worked correctly until sometime in late December when, Chandler says, it developed a problem, causing the 2006 budget to show a $5 million deficit in the water and sewer fund. This error was in the copy of the budget that the city council members were provided and was posted on the city's Web site for the Jan. 3 city council meeting. The error was not present in the budget that was posted on Dec. 14. The difference between the two budgets led the council to postpone voting on the budget until it could be clarified.


AstraZeneca reaffirms outlook a
The Telegraph Friday 01 June 2012
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booked by 10,000
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The Telegraph Friday 01 June 2012

University of Toledo loses $2.4M in projected revenue

BY RYAN E. SMITH
BLADE STAFF WRITER

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Decatur Enlarge

Things keep getting worse for the University of Toledo's finances.

Already facing significant state funding reductions for next year, UT officials have discovered an internal budgeting erro that means they will have $2.4 million less to work with tha anticipated.

The mistake - a typo in a formula that led officials to overestimate projected revenue - was found Tuesday, the day before the UT board of trustees was to approve next year's budget and not long after the state informed UT that its support would be about $500,000 less than expected next year, said William Decatur, senior vice president for finance, technology, and operations.

All this happened after UT officials put together a budget that dealt with $1.5 million in state cuts for the 2004-05 academic year.

"It's incredibly frustrating," Mr. Decatur said. "It causes us to reset our expectations."

The board put off considering the budget this week and is expected to approve an amended version in June.

The budget as originally proposed had funding for a number of new initiatives, including $800,000 for a plan to hire 1 full-time faculty and $120,000 for a minority faculty hiring assistance plan. Those items are part of UT's strategic pla and will not be sacrificed even with the budget shortfall, officials

AstraZeneca reaffirms outlook a
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NEWS FROM REUTERS

TransAlta Says Clerical Snafu Costs It $24 Million

Tuesday, June 3, 2003 19:06 EDT

By Cameron French

Hide advertisement

TORONTO (Reuters) - TransAlta Corp. said on Tuesday it will take a $24 million charge to earnings after a bidding snafu landed it more U.S. power transmission hedging contracts than it bargained for, at higher prices than it wanted to pay.

TransAlta, Canada's top investor-owned power generator, said it submitted the erroneous bid to the New York Independent System Operator for May 2003 transmission congestion contracts. The ISO manages the state's power transmission system and the contracts hedge the cost of transmission.

But the company's computer spreadsheet contained mismatched bids for the contracts, it said.

"It was literally a cut-and-paste error in an Excel spreadsheet that we did not detect when we did our final sorting and ranking bids prior to submission," TransAlta chief executive Steve Snyder said in a conference call.

cut and paste error

The important thing is to learn from it, which

As New York ISO rules did not allow for a reversal of the bids, the contracts went ahead.

The Telegraph Friday 01 June 2012

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BY RYAN E. SMITH
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Enlarge

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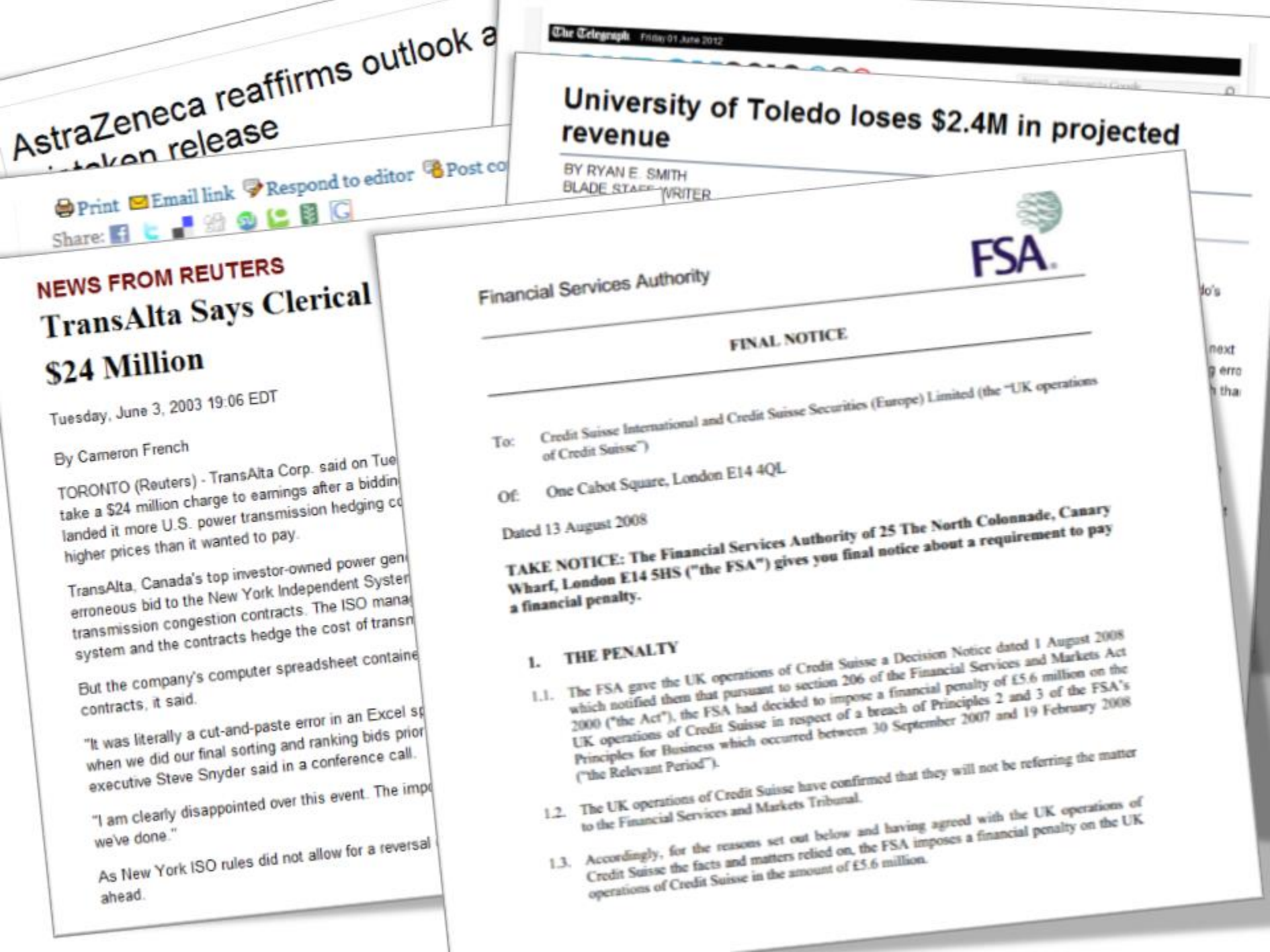

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The Telegraph Friday 01 June 2012

University of Toledo loses $2.4M in projected revenue

BY RYAN E. SMITH
BLADE STAFF WRITER

Financial Services Authority

FSA

FINAL NOTICE

To: Credit Suisse International and Credit Suisse Securities (Europe) Limited (the "UK operations of Credit Suisse")

Of: One Cabot Square, London E14 4QL

Dated 13 August 2008

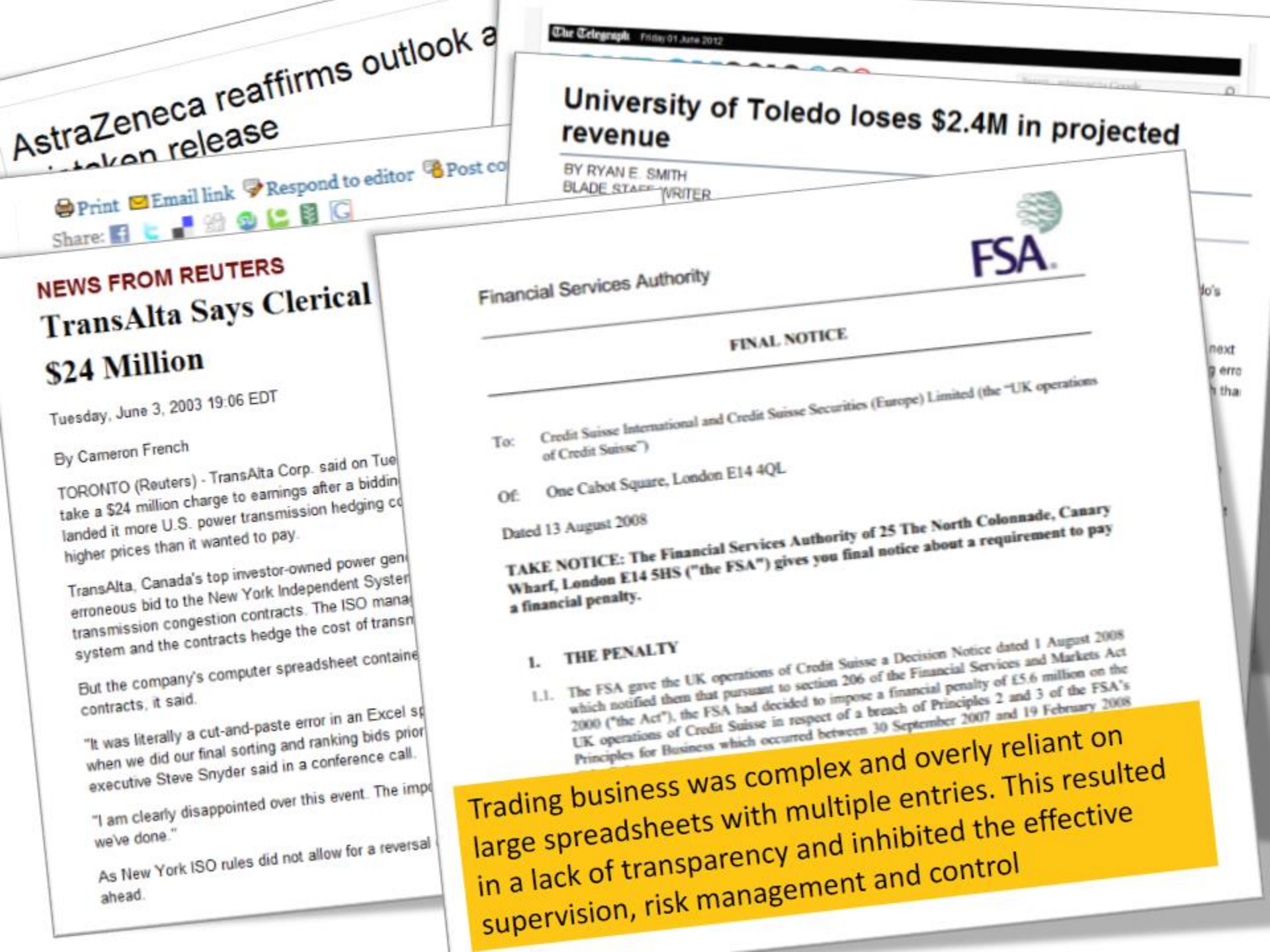
TAKE NOTICE: The Financial Services Authority of 25 The North Colonnade, Canary Wharf, London E14 5HS ("the FSA") gives you final notice about a requirement to pay a financial penalty.

1. THE PENALTY

1.1. The FSA gave the UK operations of Credit Suisse a Decision Notice dated 1 August 2008 which notified them that pursuant to section 206 of the Financial Services and Markets Act 2000 ("the Act"), the FSA had decided to impose a financial penalty of £5.6 million on the UK operations of Credit Suisse in respect of a breach of Principles 2 and 3 of the FSA's Principles for Business which occurred between 30 September 2007 and 19 February 2008 ("the Relevant Period").

1.2. The UK operations of Credit Suisse have confirmed that they will not be referring the matter to the Financial Services and Markets Tribunal.

1.3. Accordingly, for the reasons set out below and having agreed with the UK operations of Credit Suisse the facts and matters relied on, the FSA imposes a financial penalty on the UK operations of Credit Suisse in the amount of £5.6 million.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Financial Services Authority
FSA
FINAL NOTICE
To: Credit Suisse International and Credit Suisse Securities (Europe) Limited (the "UK operations of Credit Suisse")
Of: One Cabot Square, London E14 4QL
Dated 13 August 2008
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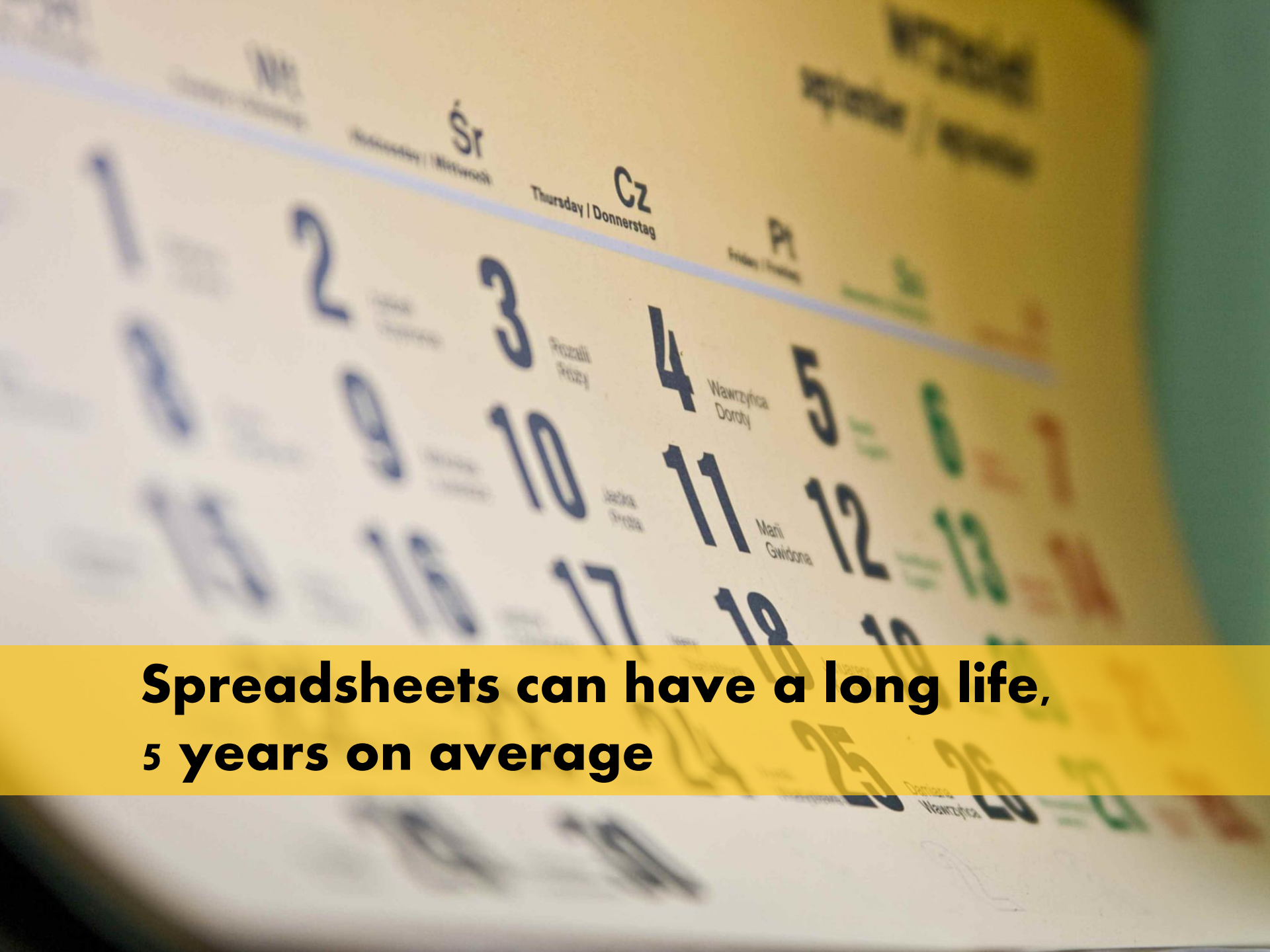
Trading business was complex and overly reliant on large spreadsheets with multiple entries. This resulted in a lack of transparency and inhibited the effective supervision, risk management and control

We researched spreadsheets for the past 4 years at Delft University

We interviewed spreadsheet professionals


We analyzed spreadsheets


Financial professionals spend 2 days a week working with Excel

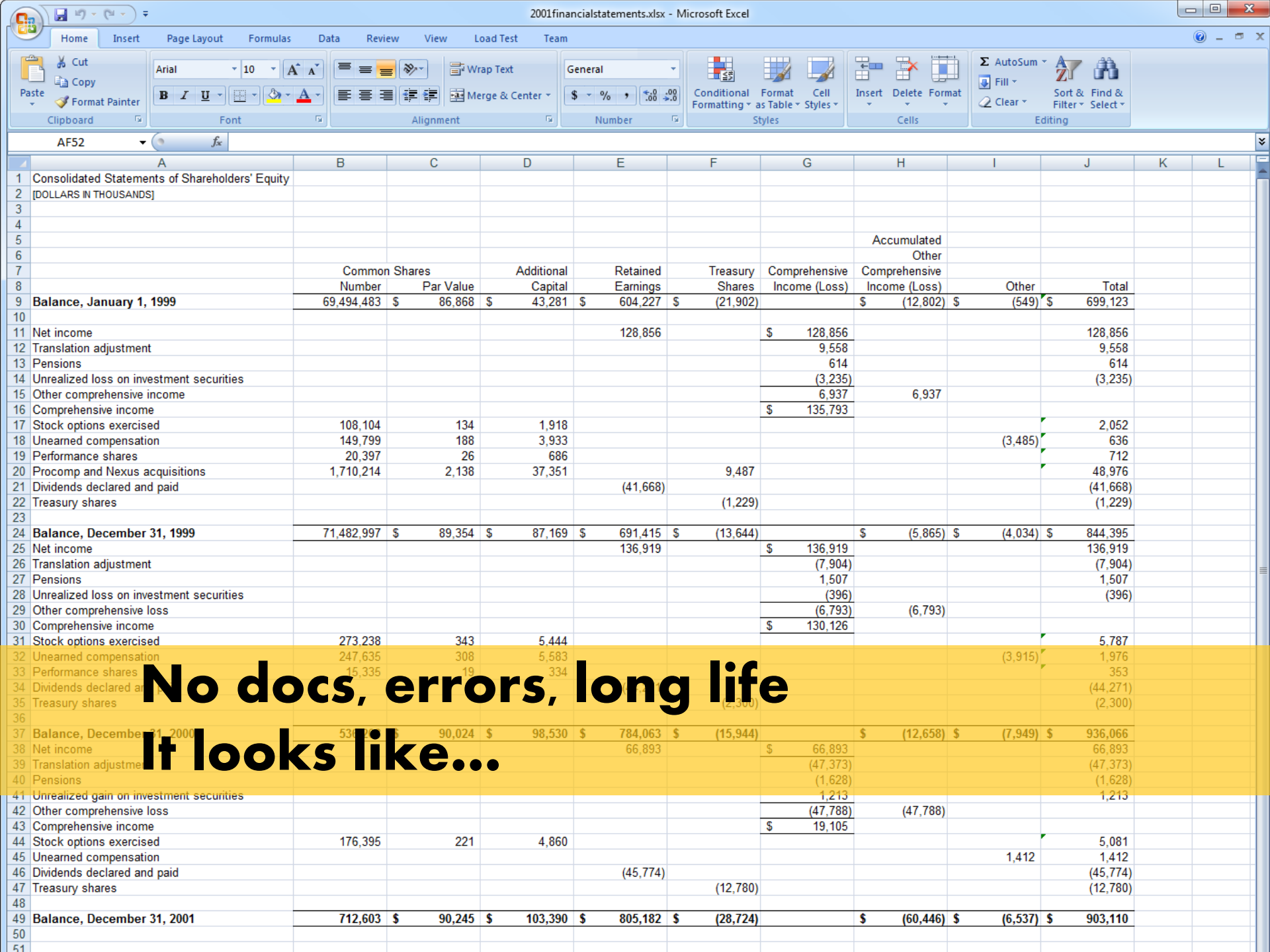


Spreadsheets can have a long life,
5 years on average

Average sheet is used by 12 different people

There is a gap! Between importance and treatment.

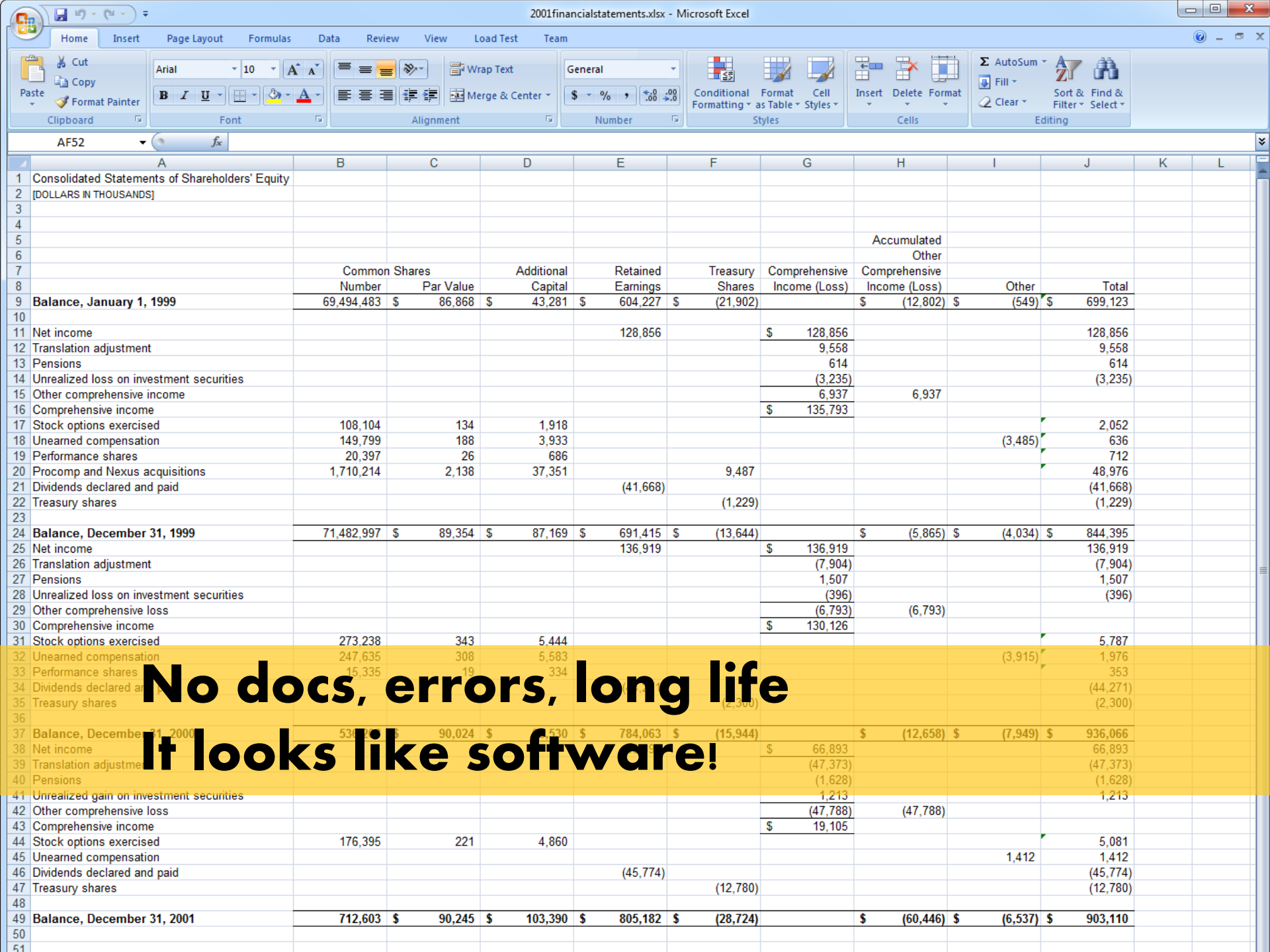

We try to bridge this gap with methods from software engineering.



	A	B	C	D	E	F	G	H	I	J	K	L
1	Consolidated Statements of Shareholders' Equity											
2	[DOLLARS IN THOUSANDS]											
3												
4												
5								Accumulated				
6								Other				
7		Common Shares		Additional	Retained	Treasury	Comprehensive	Comprehensive				
8		Number	Par Value	Capital	Earnings	Shares	Income (Loss)	Income (Loss)	Other	Total		
9	**Balance, January 1, 1999**	69,494,483	$ 86,868	$ 43,281	$ 604,227	$ (21,902)		$ (12,802)	$ (549)	$ 699,123		
10												
11	Net income				128,856		$ 128,856			128,856		
12	Translation adjustment						9,558			9,558		
13	Pensions						614			614		
14	Unrealized loss on investment securities						(3,235)			(3,235)		
15	Other comprehensive income						6,937	6,937				
16	Comprehensive income						$ 135,793					
17	Stock options exercised	108,104	134	1,918						2,052		
18	Unearned compensation	149,799	188	3,933					(3,485)	636		
19	Performance shares	20,397	26	686						712		
20	Procomp and Nexus acquisitions	1,710,214	2,138	37,351		9,487				48,976		
21	Dividends declared and paid				(41,668)					(41,668)		
22	Treasury shares					(1,229)				(1,229)		
23												
24	**Balance, December 31, 1999**	71,482,997	$ 89,354	$ 87,169	$ 691,415	$ (13,644)		$ (5,865)	$ (4,034)	$ 844,395		
25	Net income				136,919		$ 136,919			136,919		
26	Translation adjustment						(7,904)			(7,904)		
27	Pensions						1,507			1,507		
28	Unrealized loss on investment securities						(396)			(396)		
29	Other comprehensive loss						(6,793)	(6,793)				
30	Comprehensive income						$ 130,126					
31	Stock options exercised	273,238	343	5,444						5,787		
32	Unearned compensation	247,635	308	5,583					(3,915)	1,976		
33	Performance shares	15,335	19	334						353		
34	Dividends declared a									(44,271)		
35	Treasury shares					(2,300)				(2,300)		
36												
37	Balance, Decembe 31, 2000	53	90,024	$ 98,530	$ 784,063	$ (15,944)		$ (12,658)	$ (7,949)	$ 936,066		
38	Net income				66,893		$ 66,893			66,893		
39	Translation adjustme						(47,373)			(47,373)		
40	Pensions						(1,628)			(1,628)		
41	Unrealized gain on investment securities						1,213			1,213		
42	Other comprehensive loss						(47,788)	(47,788)				
43	Comprehensive income						$ 19,105					
44	Stock options exercised	176,395	221	4,860						5,081		
45	Unearned compensation								1,412	1,412		
46	Dividends declared and paid				(45,774)					(45,774)		
47	Treasury shares					(12,780)				(12,780)		
48												
49	**Balance, December 31, 2001**	**712,603**	**$ 90,245**	**$ 103,390**	**$ 805,182**	**$ (28,724)**		**$ (60,446)**	**$ (6,537)**	**$ 903,110**		
50												
51												

No docs, errors, long life

It looks like...



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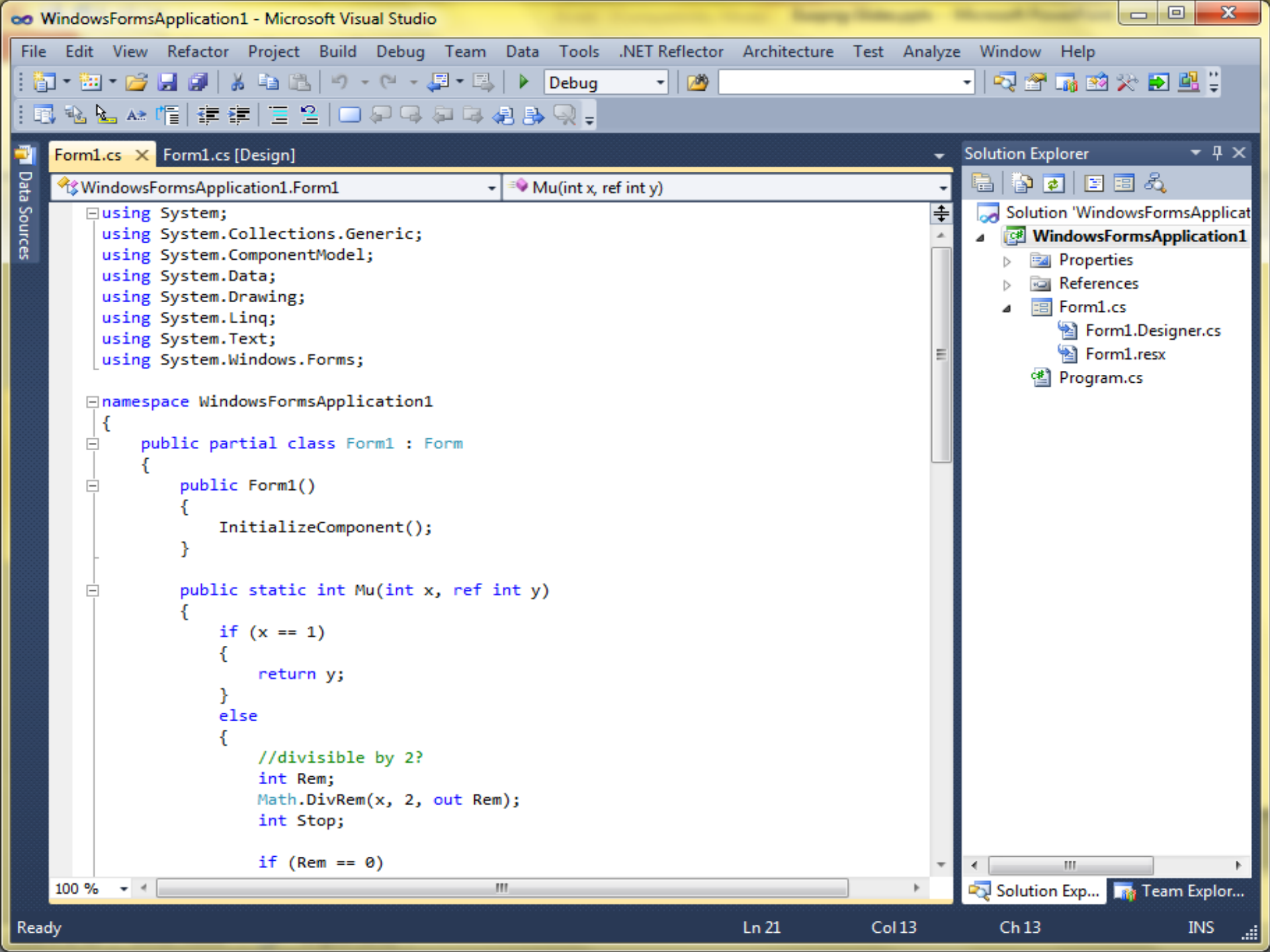
50												
51												

No docs, errors, long life

It looks like software!

Spreadsheet users lack great tool support


WindowsFormsApplication1 - Microsoft Visual Studio
File Edit View Refactor Project Build Debug Team Data Tools .NET Reflector Architecture Test Analyze Window Help
Debug
Form1.cs
Form1.cs [Design]
WindowsFormsApplication1.Form1
Mu(int x, ref int y)
using System;
using System.Collections.Generic;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Linq;
using System.Text;
using System.Windows.Forms;
namespace WindowsFormsApplication1
{
public partial class Form1 : Form
{
public Form1()
{
InitializeComponent();
}
public static int Mu(int x, ref int y)
{
if (x == 1)
{
return y;
}
else
{
//divisible by 2?
int Rem;
Math.DivRem(x, 2, out Rem);
int Stop;
if (Rem == 0)
Solution Explorer
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WindowsFormsApplication1
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References
Form1.cs
Form1.Designer.cs
Form1.resx
Program.cs
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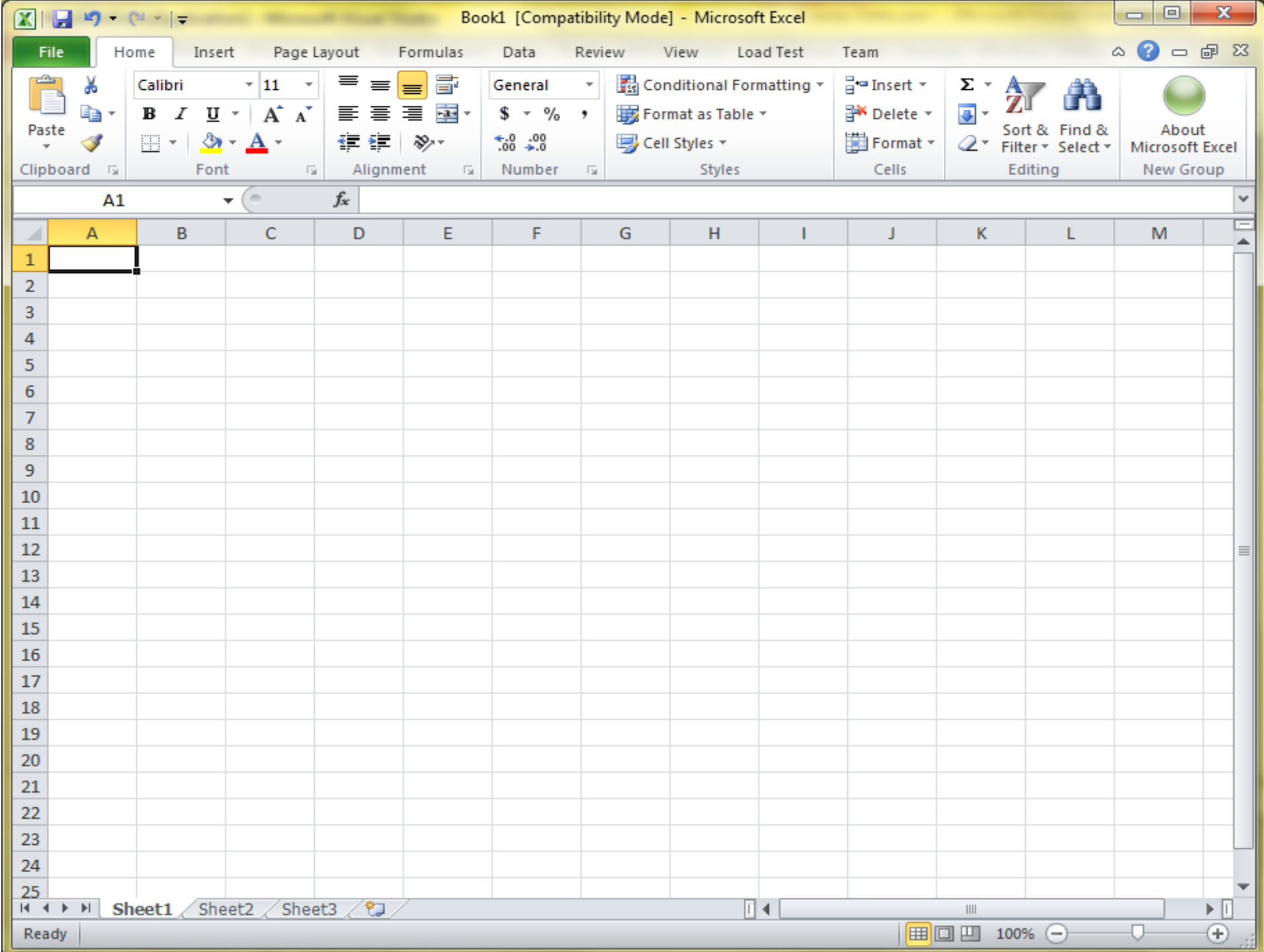
Book1 [Compatibility Mode] - Microsoft Excel
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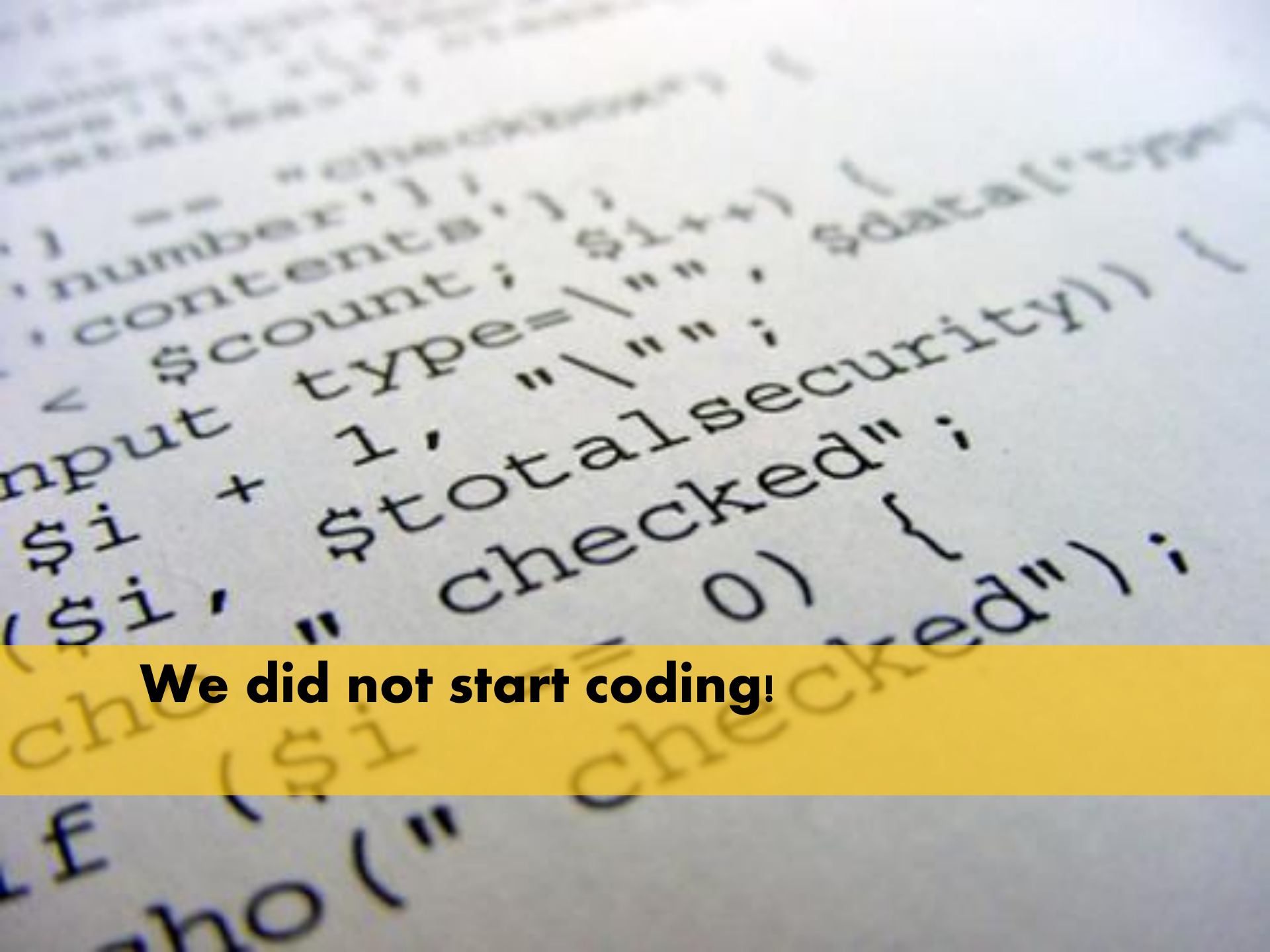

We did not start coding!

We performed 27 interviews

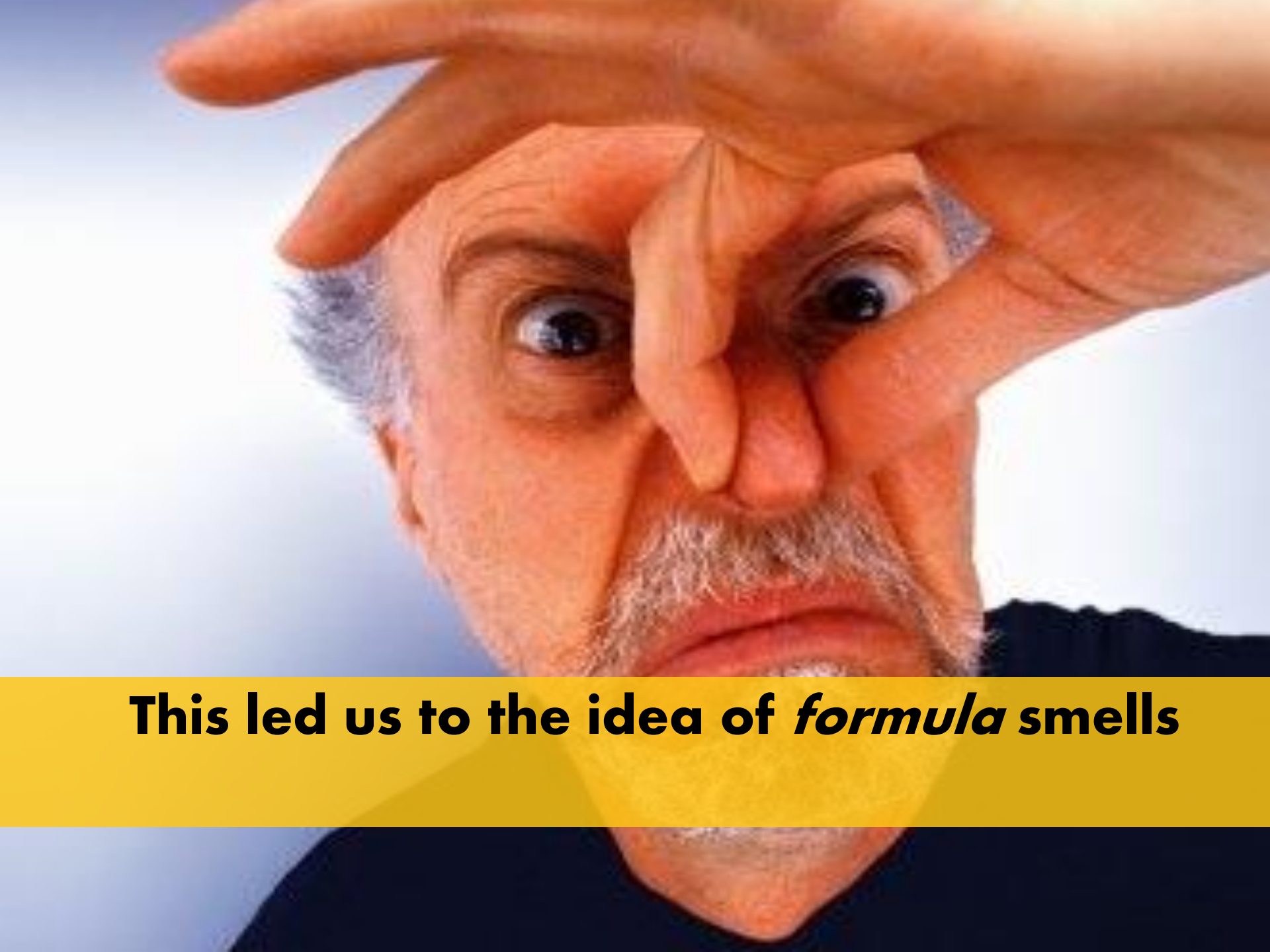
We asked them:
What annoys you?


And what makes you happy?

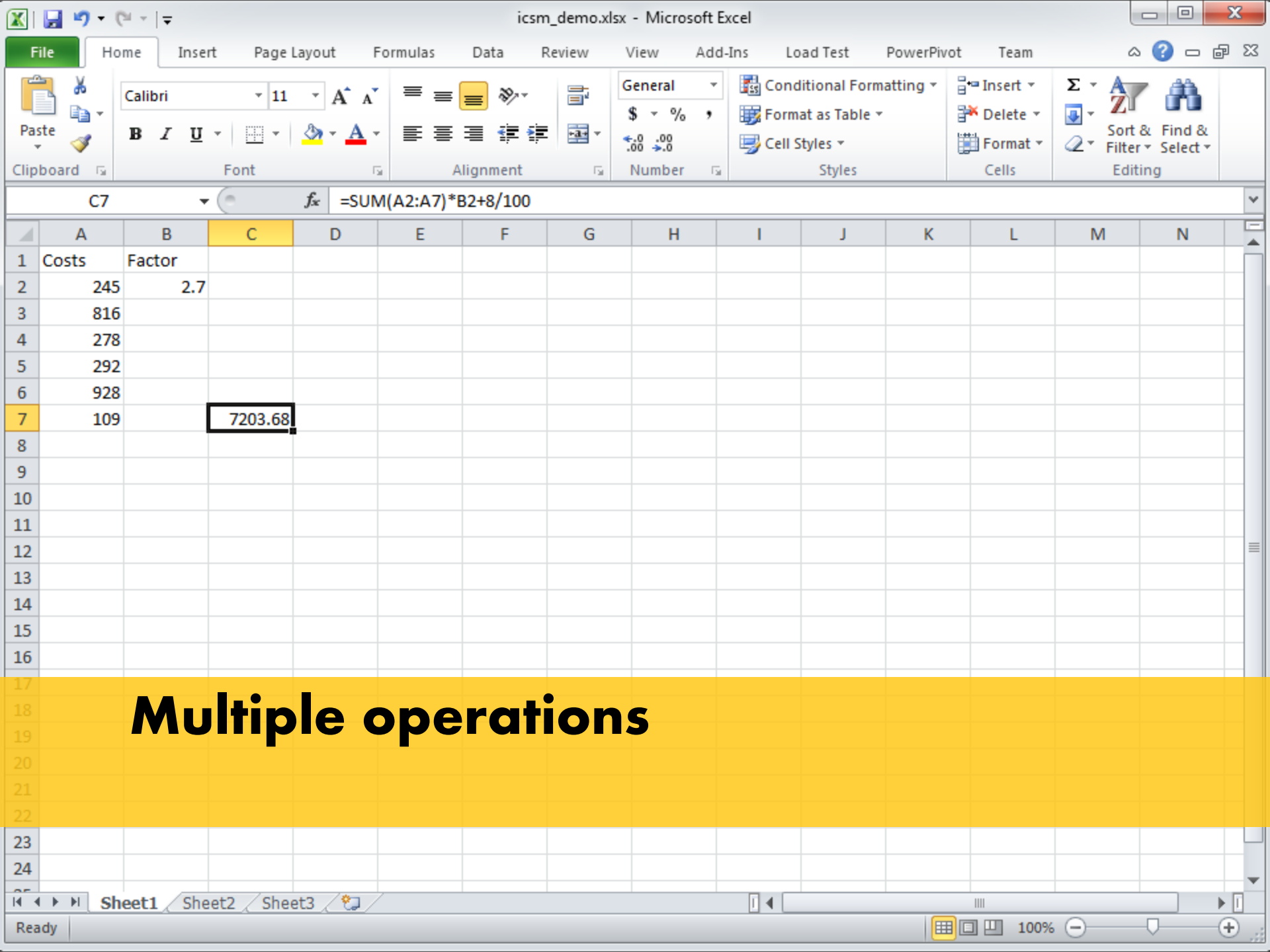
We found that problems occur when spreadsheets are transferred

We found that problems occur when spreadsheets are transferred

We found that problems occur when spreadsheets are transferred



This led us to the idea of *formula* smells


icsm_demo.xlsx - Microsoft Excel
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Editing
C7
=SUM(A2:A7)*B2+8/100
Costs
Factor
245
2.7
816
278
292
928
109
7203.68
Multiple operations
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Sheet2
Sheet3
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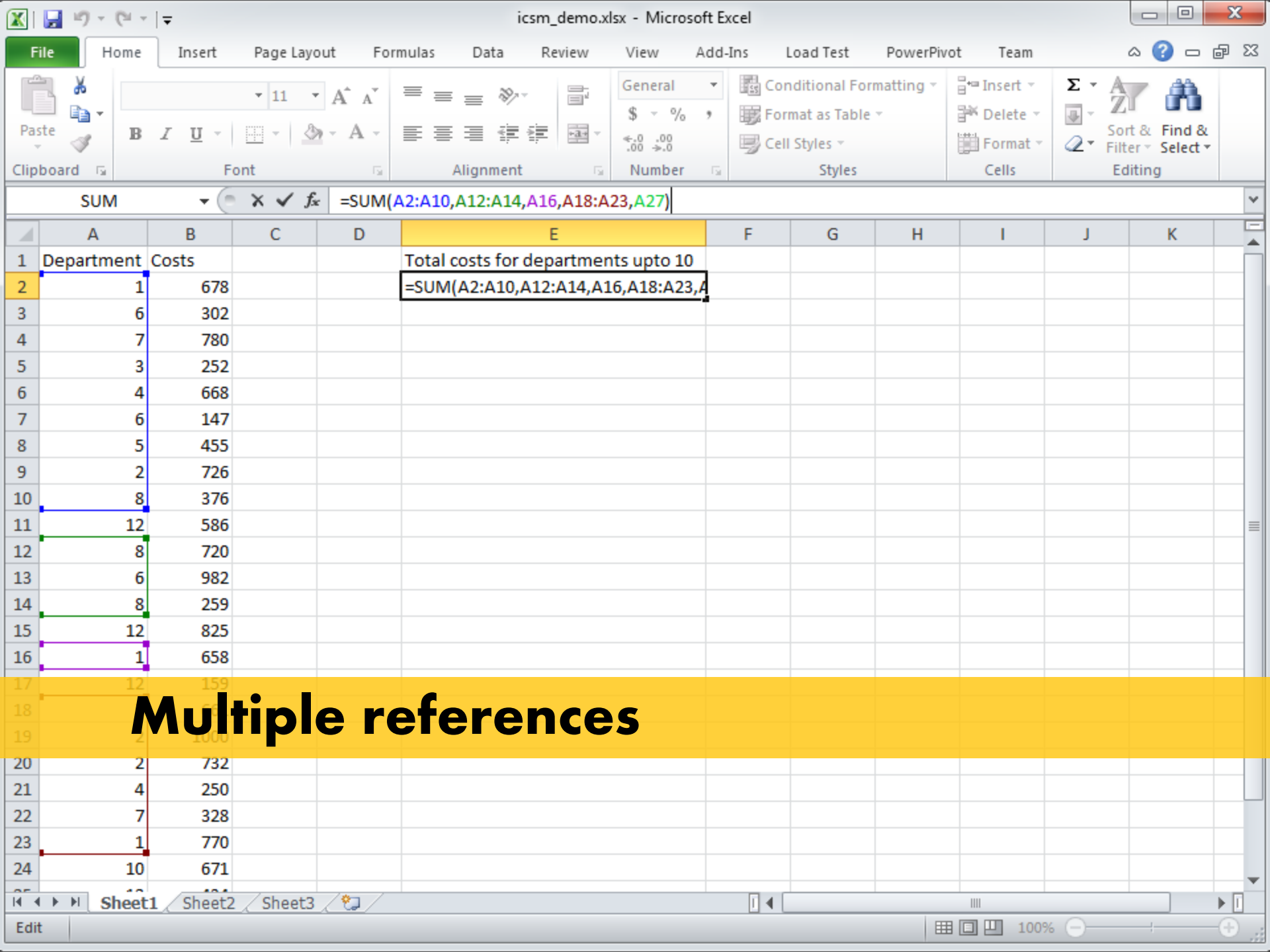
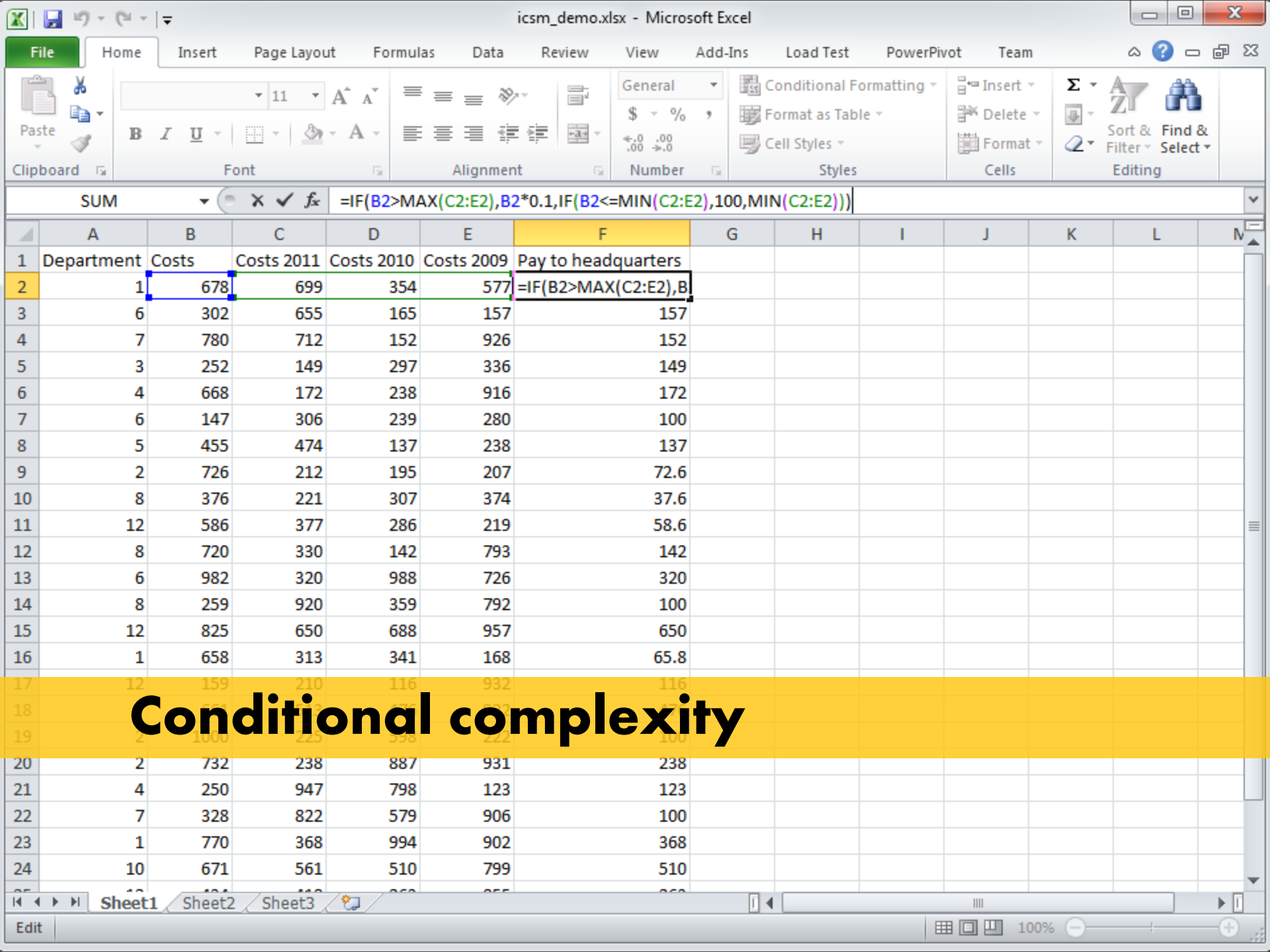
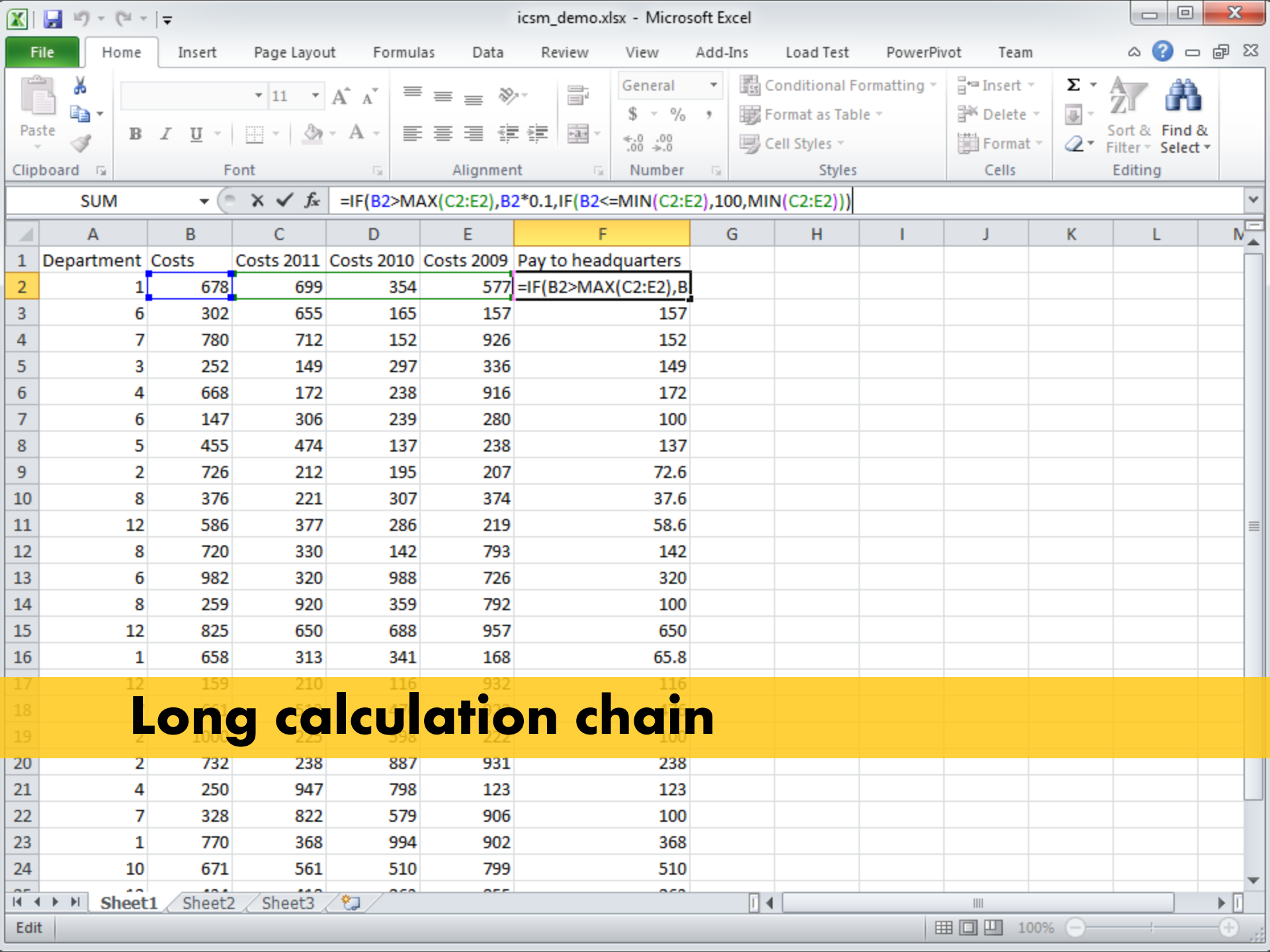


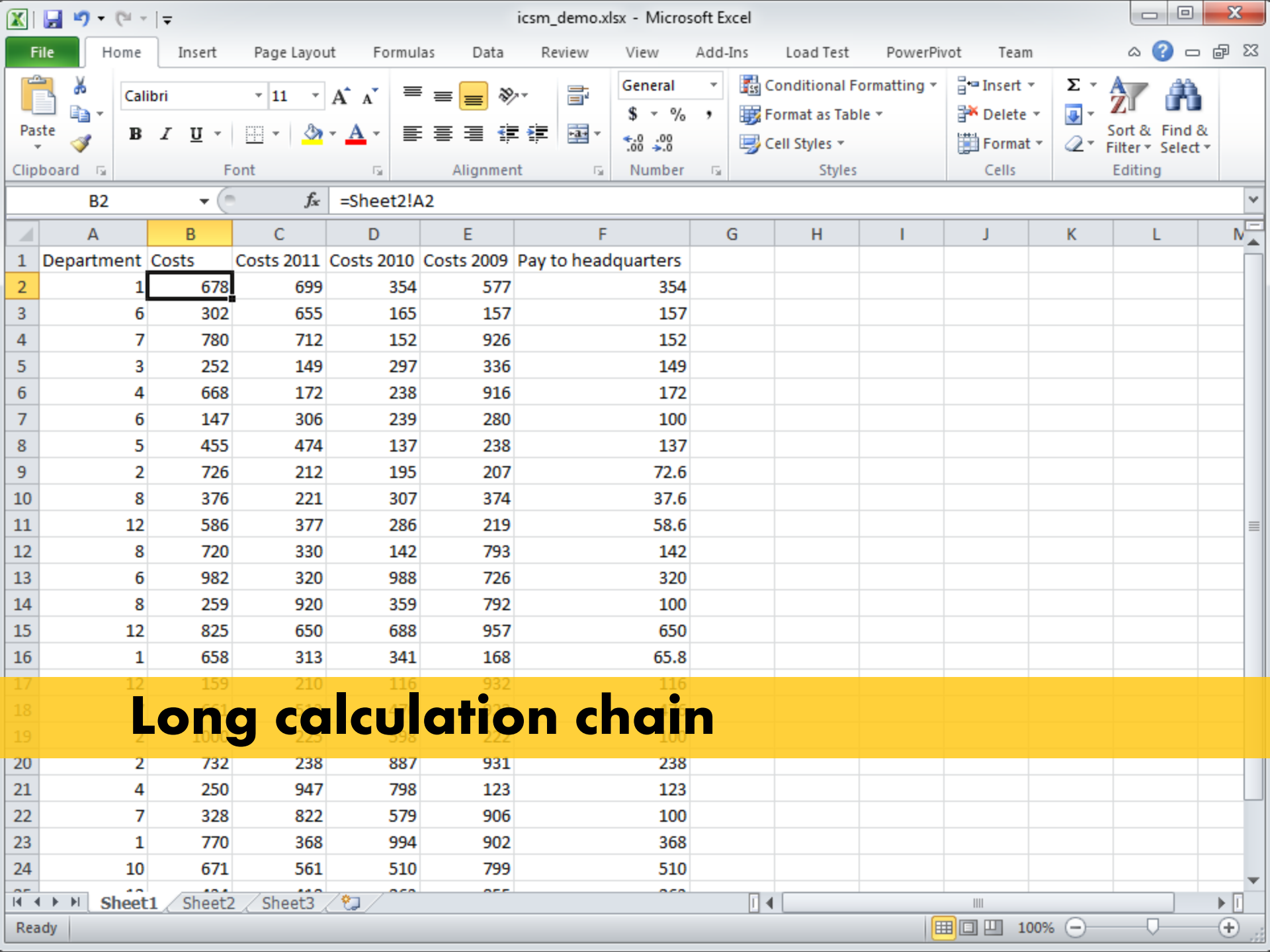
	A	B	C	D	E	F	G	H	I	J	K
1	Department	Costs			Total costs for departments upto 10						
2	1	678			=SUM(A2:A10,A12:A14,A16,A18:A23,A						
3	6	302									
4	7	780									
5	3	252									
6	4	668									
7	6	147									
8	5	455									
9	2	726									
10	8	376									
11	12	586									
12	8	720									
13	6	982									
14	8	259									
15	12	825									
16	1	658									
17	12	159									
18											
19	2	100									
20	2	732									
21	4	250									
22	7	328									
23	1	770									
24	10	671									



Conditional complexity

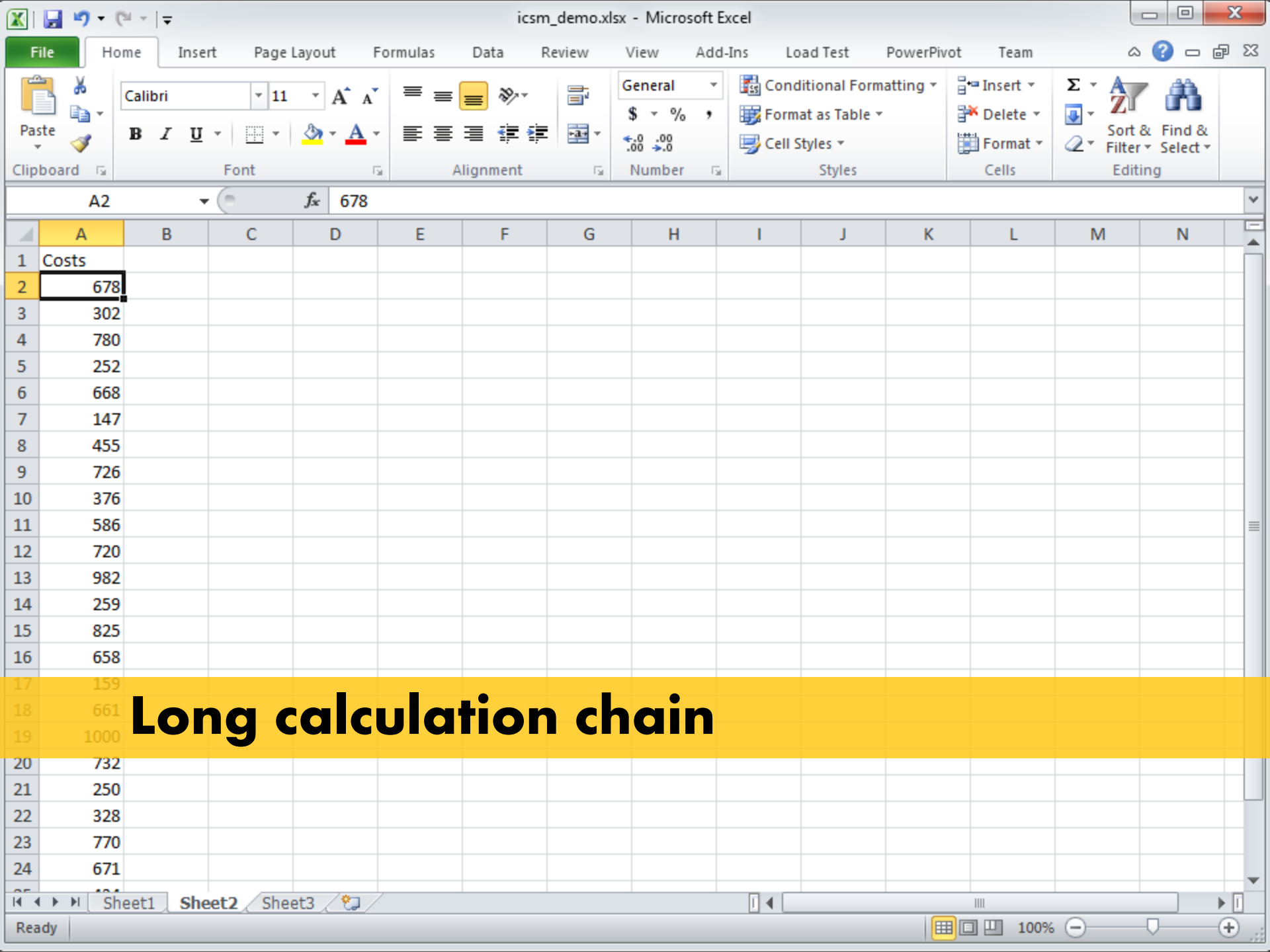


Long calculation chain



	A	B	C	D	E	F
1	Department	Costs	Costs 2011	Costs 2010	Costs 2009	Pay to headquarters
2	1	678	699	354	577	354
3	6	302	655	165	157	157
4	7	780	712	152	926	152
5	3	252	149	297	336	149
6	4	668	172	238	916	172
7	6	147	306	239	280	100
8	5	455	474	137	238	137
9	2	726	212	195	207	72.6
10	8	376	221	307	374	37.6
11	12	586	377	286	219	58.6
12	8	720	330	142	793	142
13	6	982	320	988	726	320
14	8	259	920	359	792	100
15	12	825	650	688	957	650
16	1	658	313	341	168	65.8
17	12	159	210	116	932	116
18						
19						
20	2	732	238	887	931	238
21	4	250	947	798	123	123
22	7	328	822	579	906	100
23	1	770	368	994	902	368
24	10	671	561	510	799	510

Long calculation chain


icsm_demo.xlsx - Microsoft Excel
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Costs
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302
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726
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Long calculation chain
Sheet1
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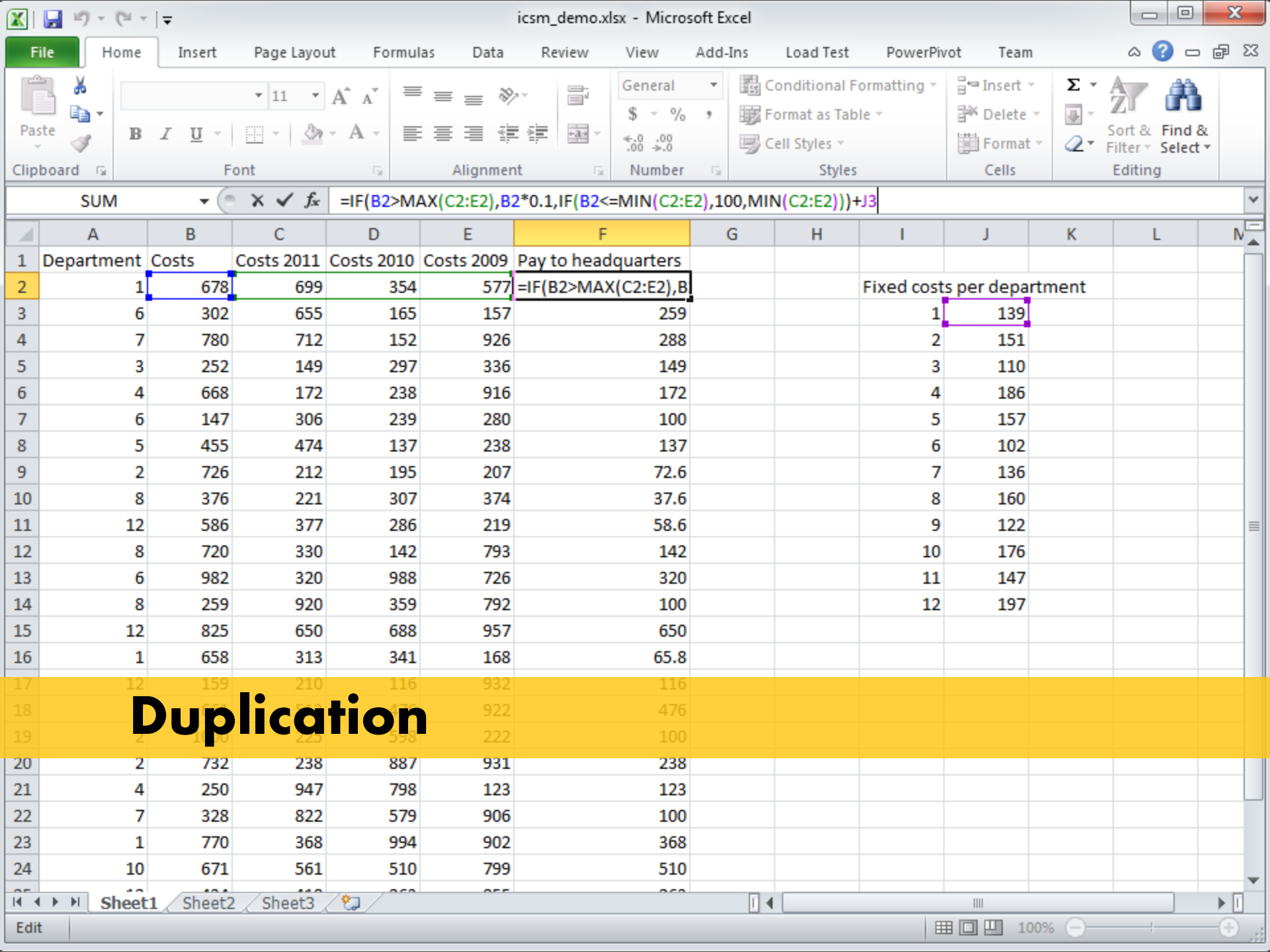
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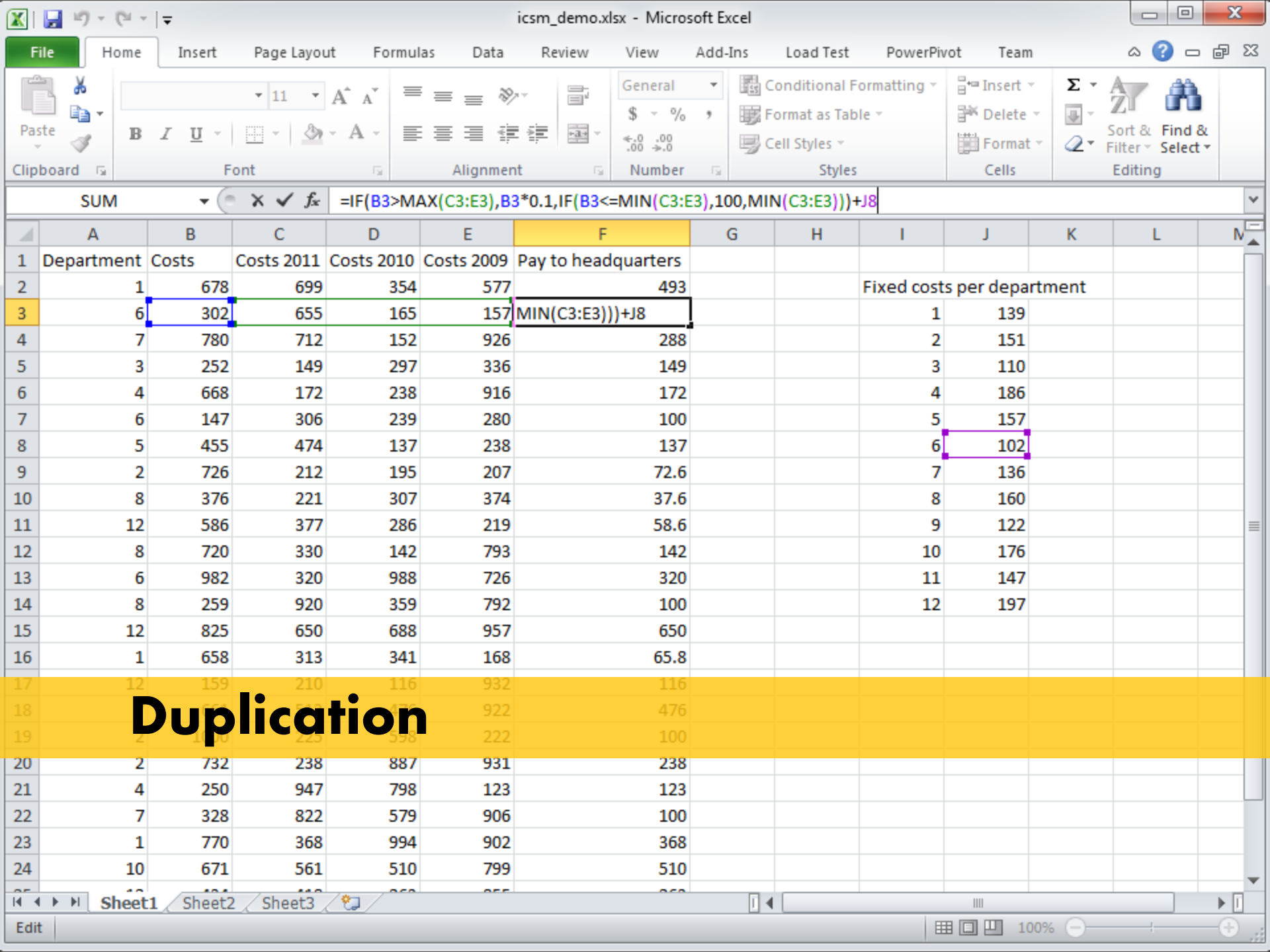
Cells
Sort & Filter
Find & Select
Editing
SUM
=IF(B2>MAX(C2:E2),B2*0.1,IF(B2<=MIN(C2:E2),100,MIN(C2:E2)))+J3
Department
Costs
Costs 2011
Costs 2010
Costs 2009
Pay to headquarters
=IF(B2>MAX(C2:E2),B
Fixed costs per department
1 139
2 151
3 110
4 186
5 157
6 102
7 136
8 160
9 122
10 176
11 147
12 197
Duplication
Sheet1
Sheet2
Sheet3
Edit
100%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Sort & Filter
Find & Select
Editing
SUM
=IF(B3>MAX(C3:E3),B3*0.1,IF(B3<=MIN(C3:E3),100,MIN(C3:E3)))+J8
Department
Costs
Costs 2011
Costs 2010
Costs 2009
Pay to headquarters
Fixed costs per department
MIN(C3:E3)))+J8
Duplication
Sheet1
Sheet2
Sheet3
Edit
100%

PerfectXL analysis plan for Spreadsheet_5.xlsx

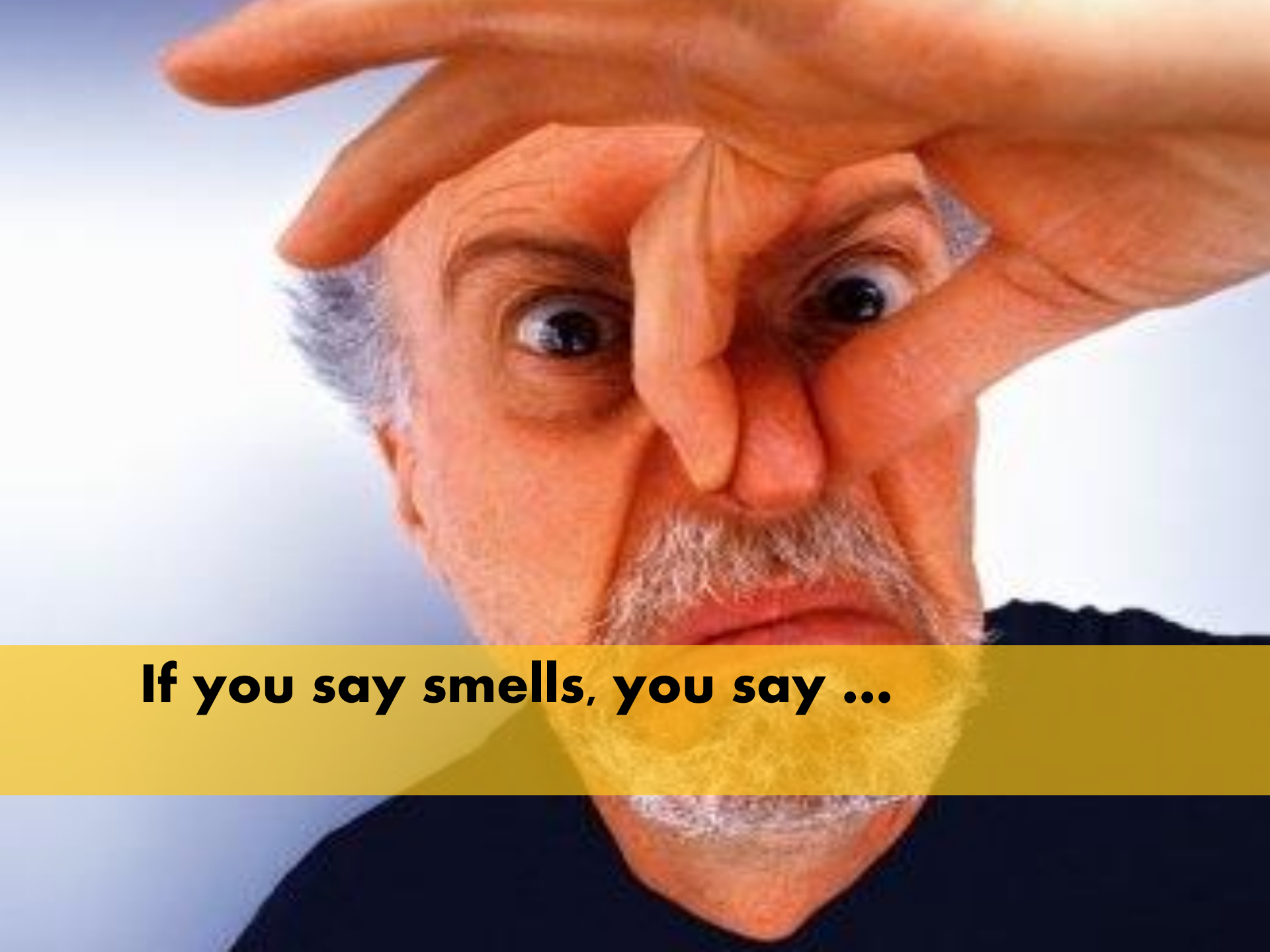
Containing fixed numbers

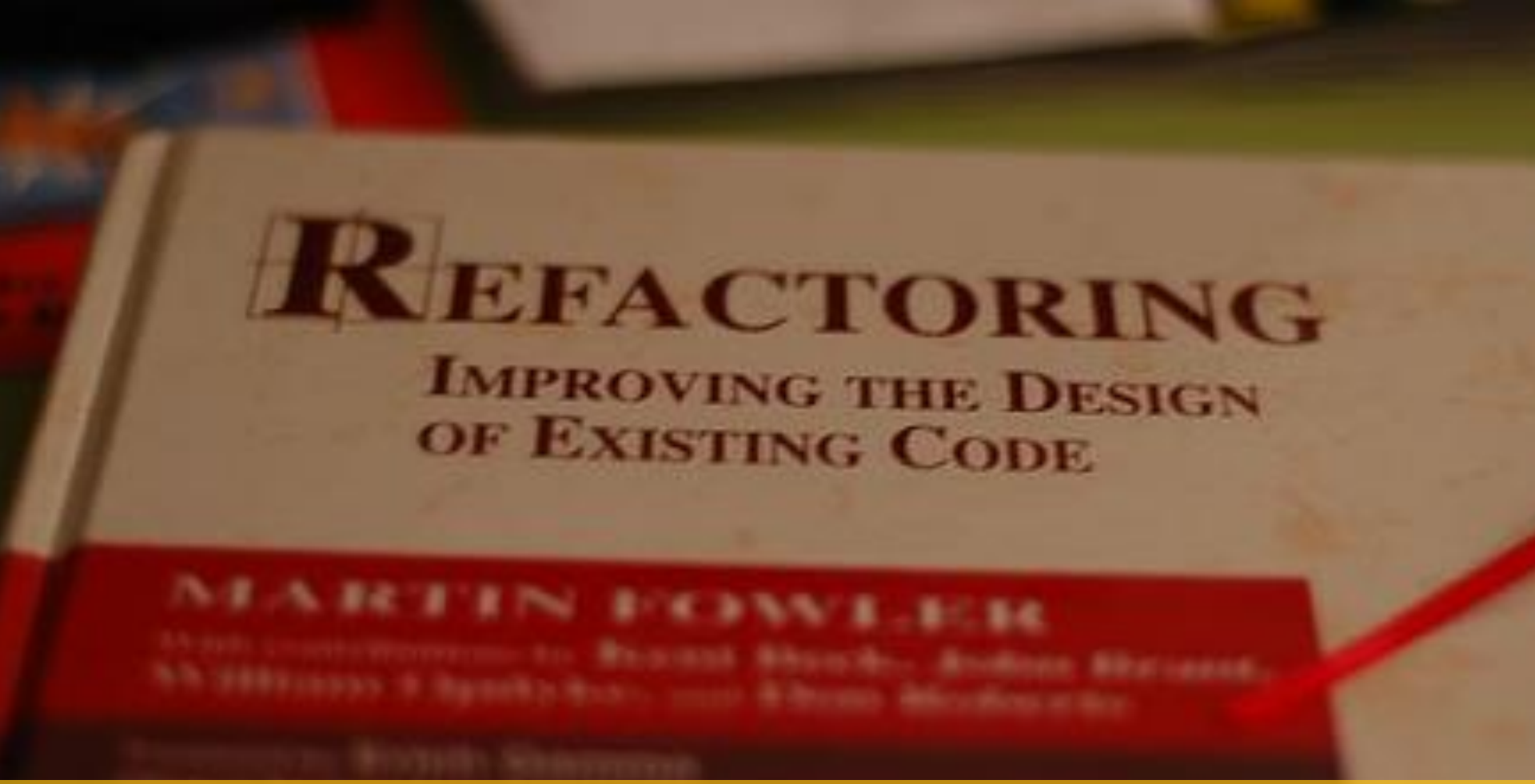
Value of Flexibility!C41 with formula (LN(C34/C35)+(G34-G36+(G35/2))*C36)/(((G35)^(0.5))*(C36^0.5))
Value of Flexibility!F41 with formula (LN(C34/C38)+(G34-G36+(G35/2))*C36)/(((G35)^(0.5))*(C36^0.5))
Value of Flexibility!C44 with formula C41-((G35^0.5)*(C36^(0.5)))
Value of Flexibility!F44 with formula F41-((G35^0.5)*(C36^(0.5)))

Many different operations

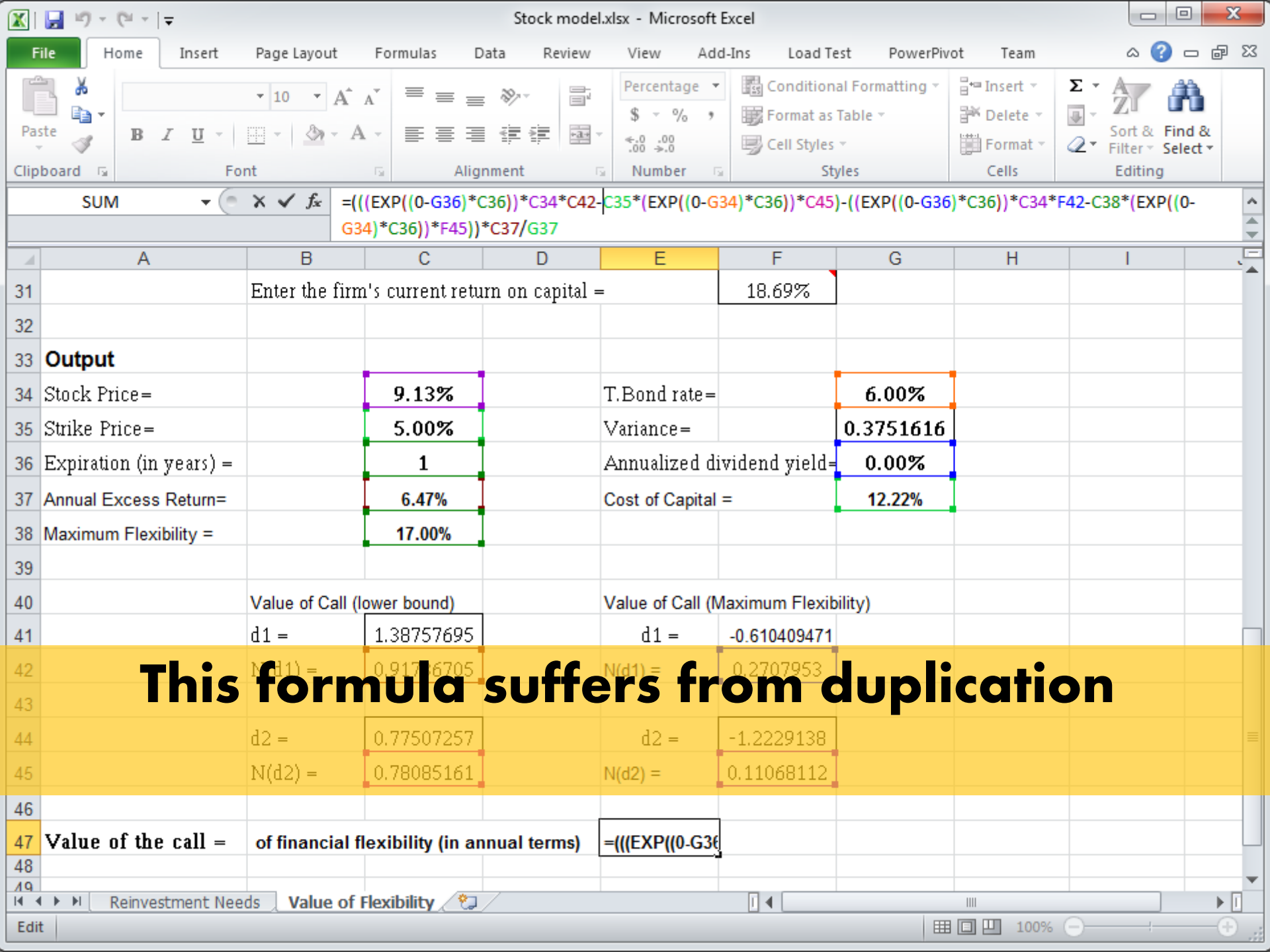
Value of Flexibility!C41 with formula (LN(C34/C35)+(G34-G36+(G35/2))*C36)/(((G35)^(0.5))*(C36^0.5))
Consider simplifying this formula
Value of Flexibility!F41 with formula (LN(C34/C38)+(G34-G36+(G35/2))*C36)/(((G35)^(0.5))*(C36^0.5))
Consider simplifying this formula
Value of Flexibility!E47 with formula (((EXP((0-G36)*C36))*C34*C42-C35*(EXP((0-G34)*C36))*C45)-((EXP((0-G36)*C36))*C34*F42-C38*(EXP((0-G34)*C36))*F45))*C37/G37
(EXP((0-G36)*C36)) occurs multiple times in this formula, consider placing it in a separate cell

We built a tool that finds smells in spreadsheets

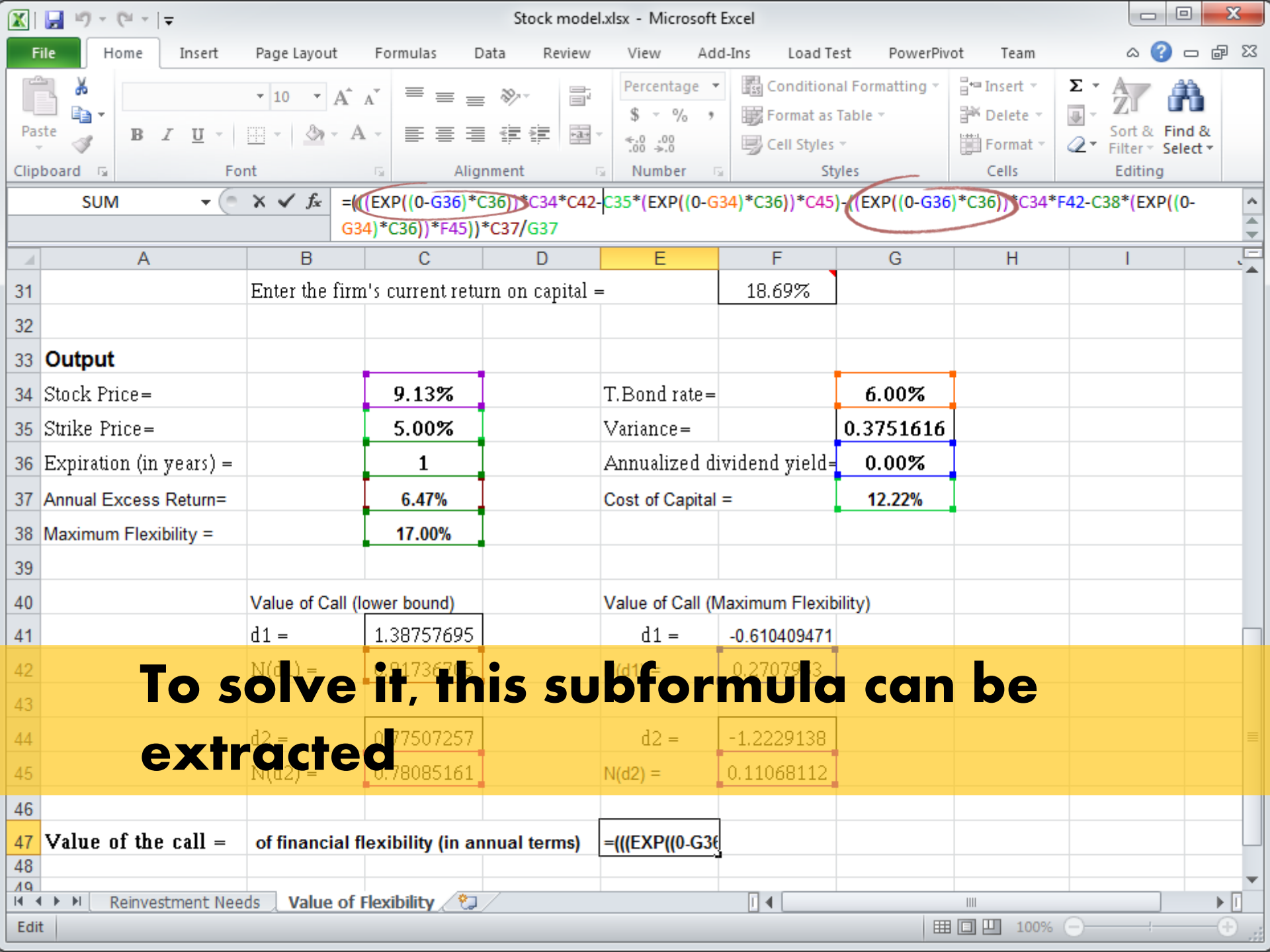

If you say smells, you say ...



If you say smells, you say refactorings



This formula suffers from duplication


Stock model.xlsx - Microsoft Excel
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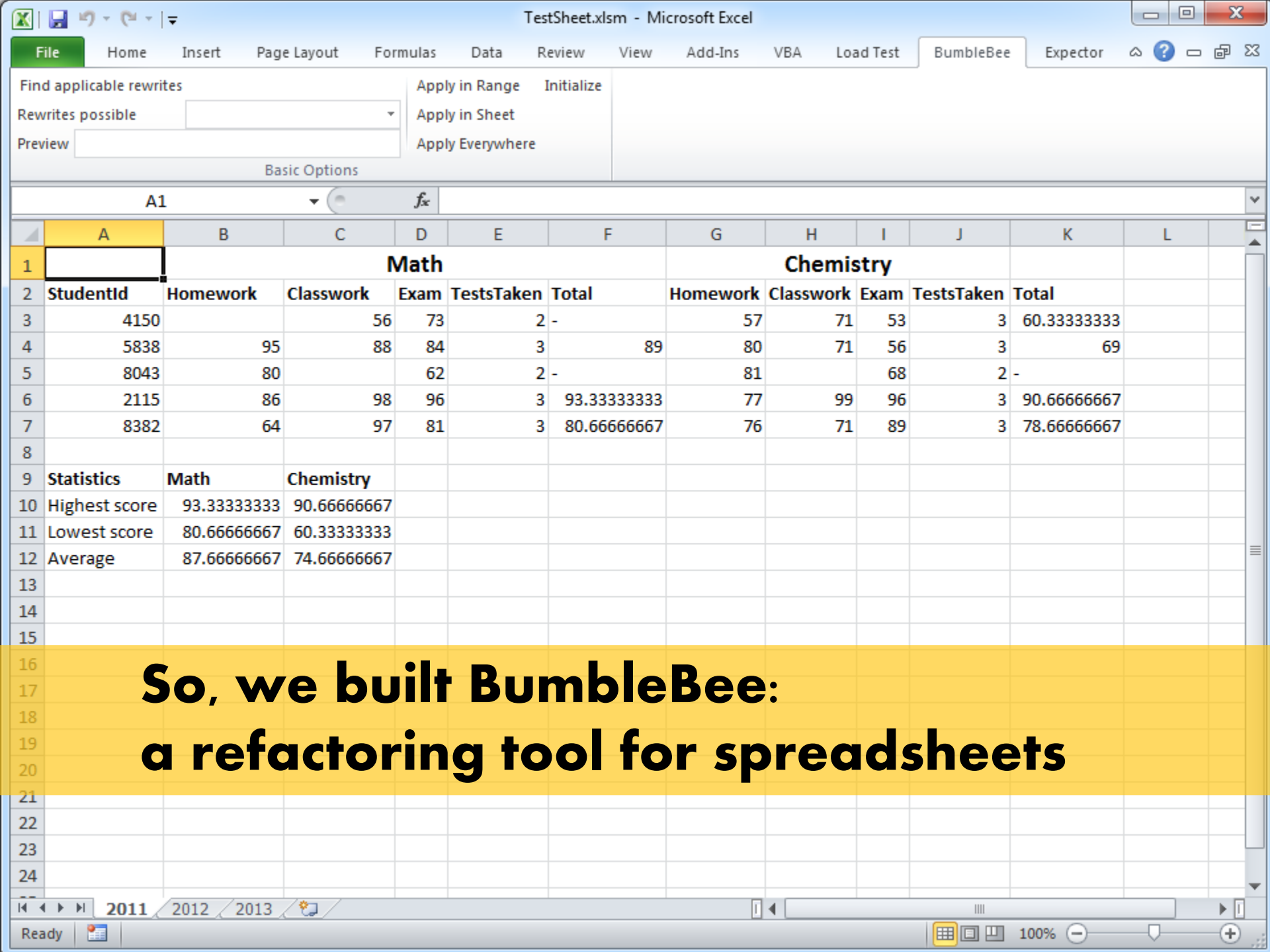
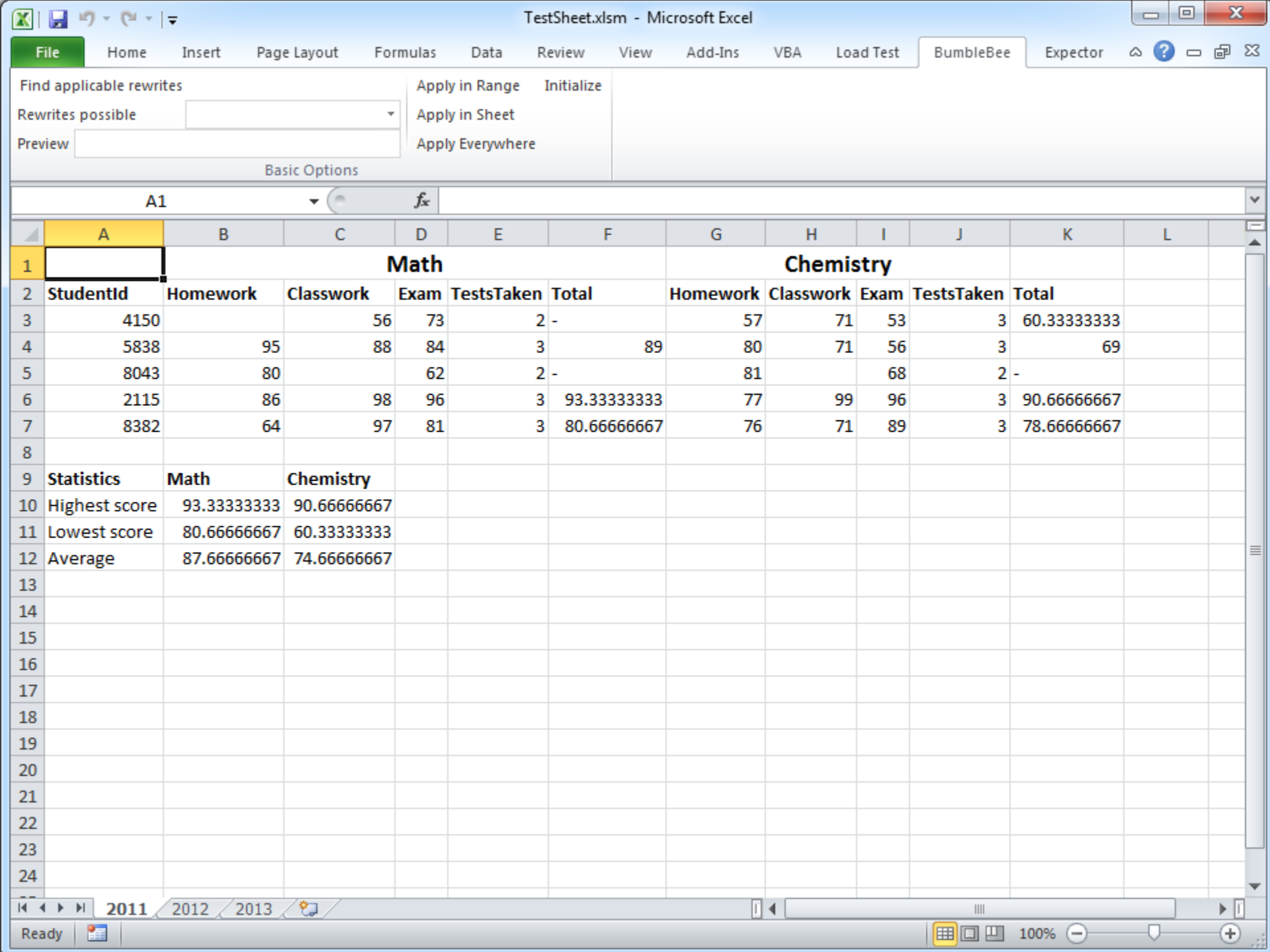
Add-Ins
Load Test
PowerPivot
Team
SUM
=(((EXP((0-G36)*C36))*C34*C42-C35*(EXP((0-G34)*C36))*C45)-((EXP((0-G36)*C36))*C34*F42-C38*(EXP((0-G34)*C36))*F45))*C37/G37
Enter the firm's current return on capital =
18.69%
Output
Stock Price=
9.13%
Strike Price=
5.00%
Expiration (in years) =
1
Annual Excess Return=
6.47%
Maximum Flexibility =
17.00%
T.Bond rate=
6.00%
Variance=
0.3751616
Annualized dividend yield=
0.00%
Cost of Capital =
12.22%
Value of Call (lower bound)
d1 =
1.38757695
d2 =
0.77507257
N(d2) =
0.78085161
Value of Call (Maximum Flexibility)
d1 =
-0.610409471
d2 =
-1.2229138
N(d2) =
0.11068112
To solve it, this subformula can be extracted
Value of the call =
of financial flexibility (in annual terms)
=(((EXP((0-G36
Reinvestment Needs
Value of Flexibility
Edit
100%

So, we built BumbleBee: a refactoring tool for spreadsheets



So, we built BumbleBee: a refactoring tool for spreadsheets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Add-Ins
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4150 - 56 73 2 - 57 71 53 3 60.33333333
5838 95 88 84 3 89 80 71 56 3 69
8043 80 62 2 - 81 68 2 -
2115 86 98 96 3 93.33333333 77 99 96 3 90.66666667
8382 64 97 81 3 80.66666667 76 71 89 3 78.66666667
Statistics
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Lowest score 80.66666667 60.33333333
Average 87.66666667 74.66666667
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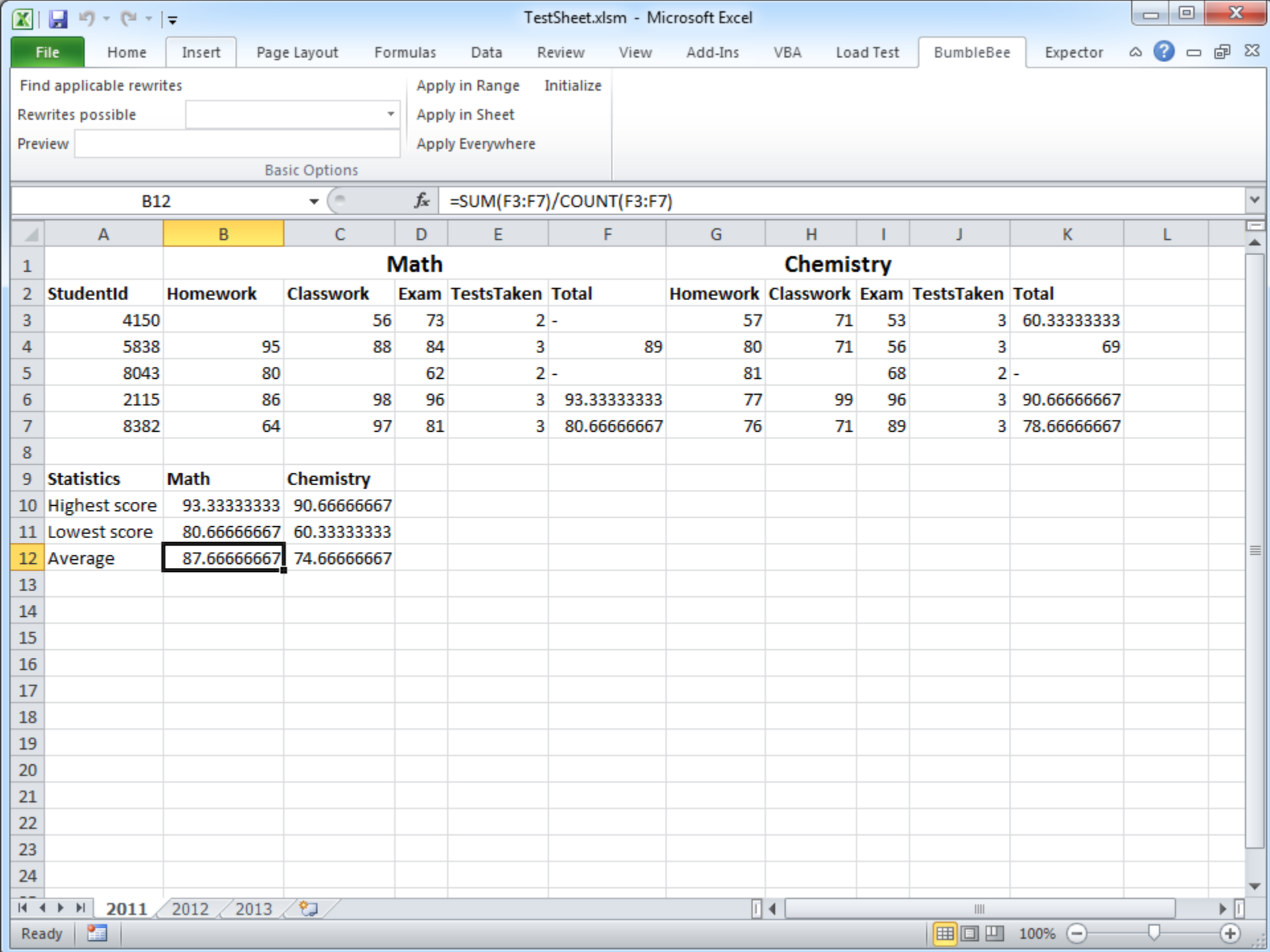

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11	Lowest score	80.66666667	60.33333333									
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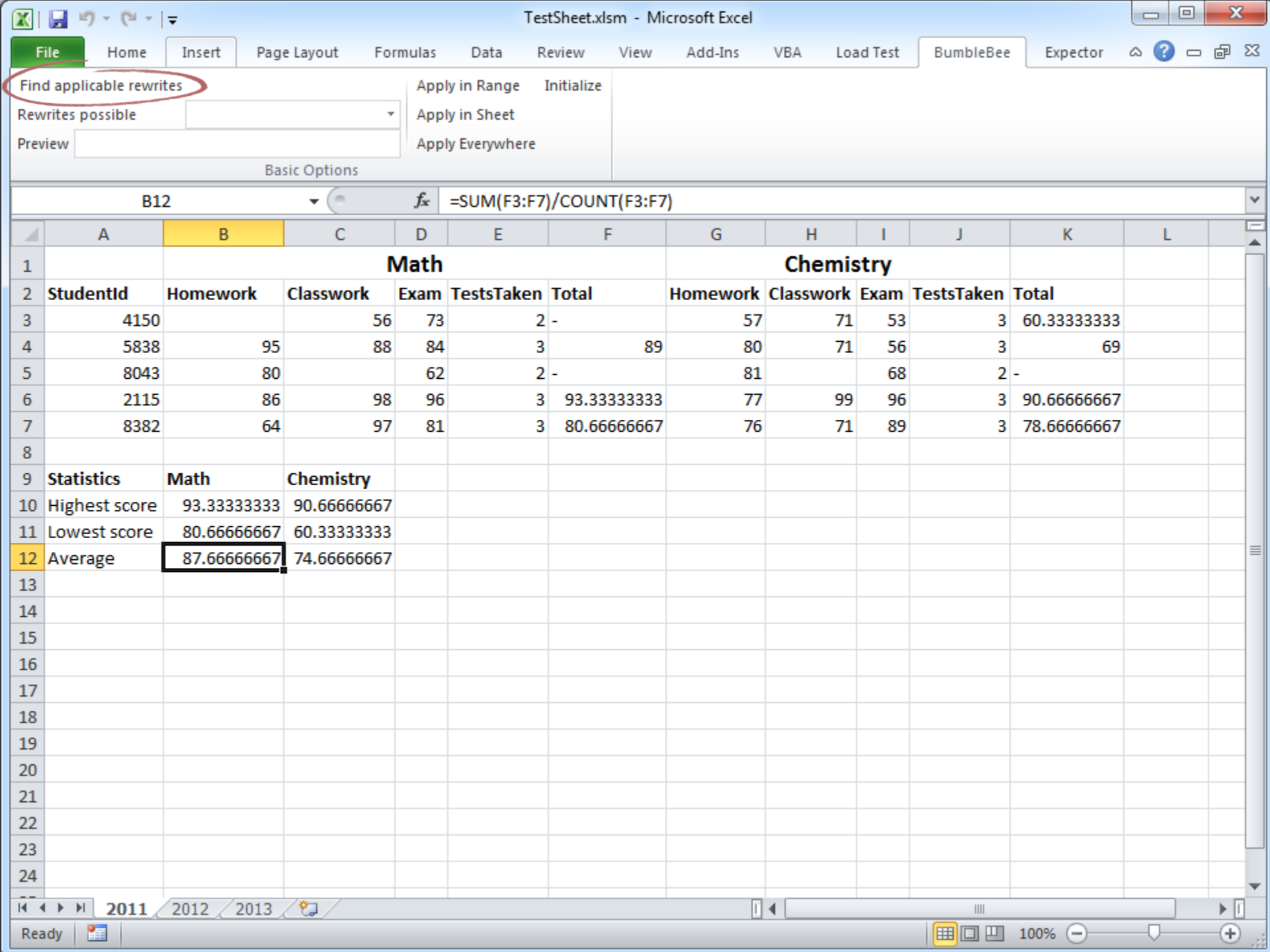

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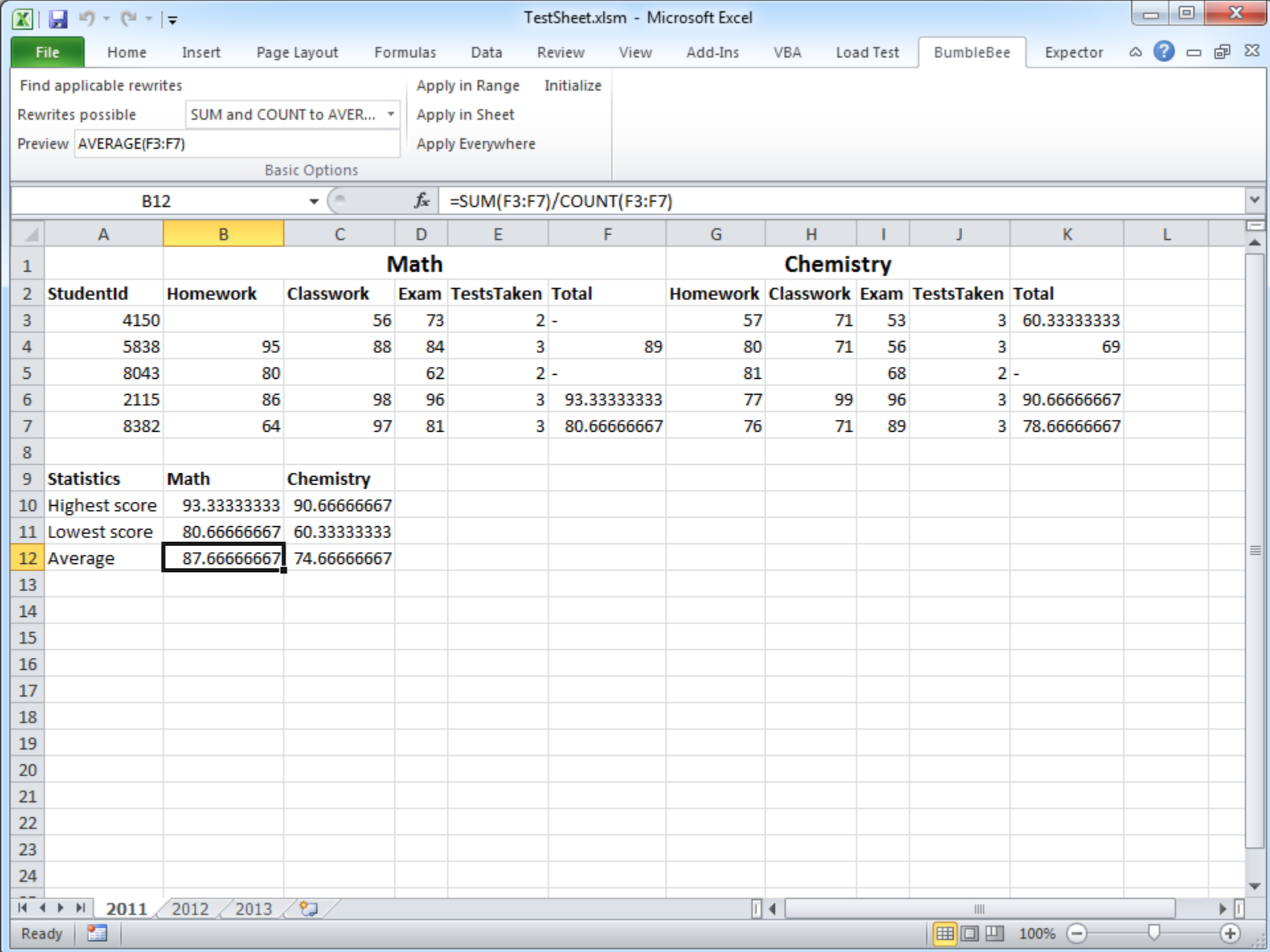
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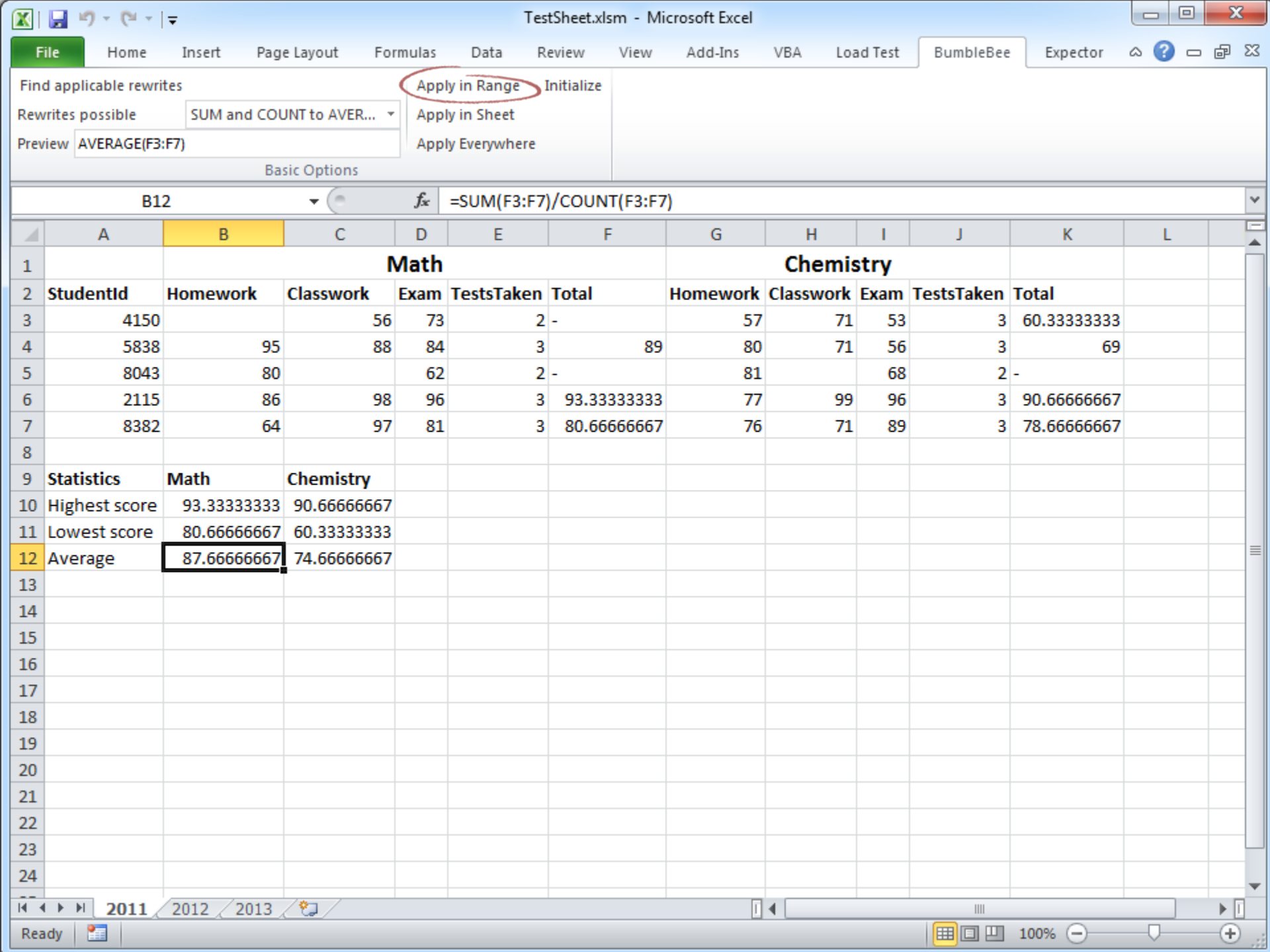

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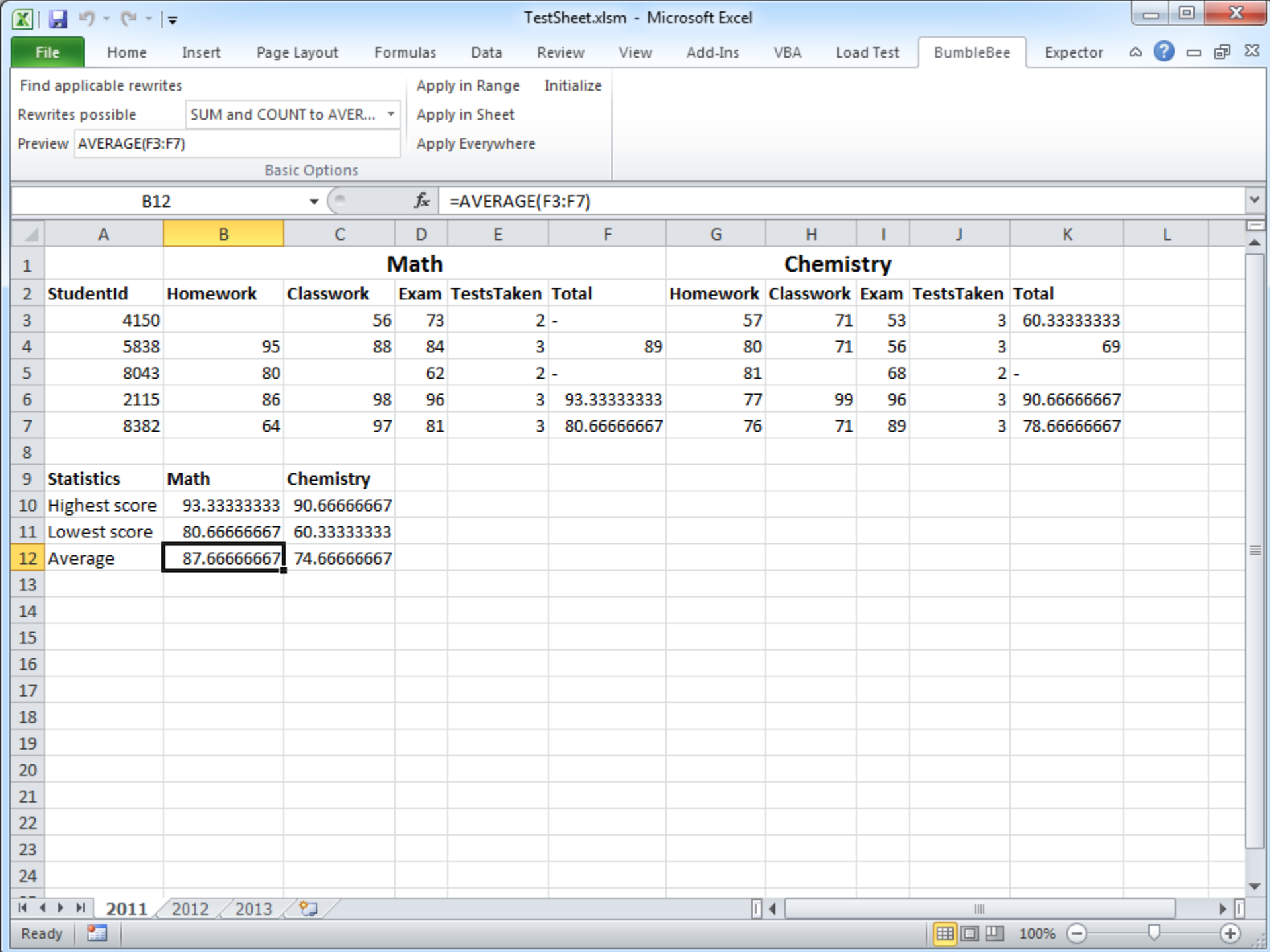
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5838 95 88 84 3 89 80 71 56 3 69
8043 80 62 2 - 81 68 2 -
2115 86 98 96 3 93.33333333 77 99 96 3 90.66666667
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Lowest score 80.66666667 60.33333333
Average 87.66666667 74.66666667
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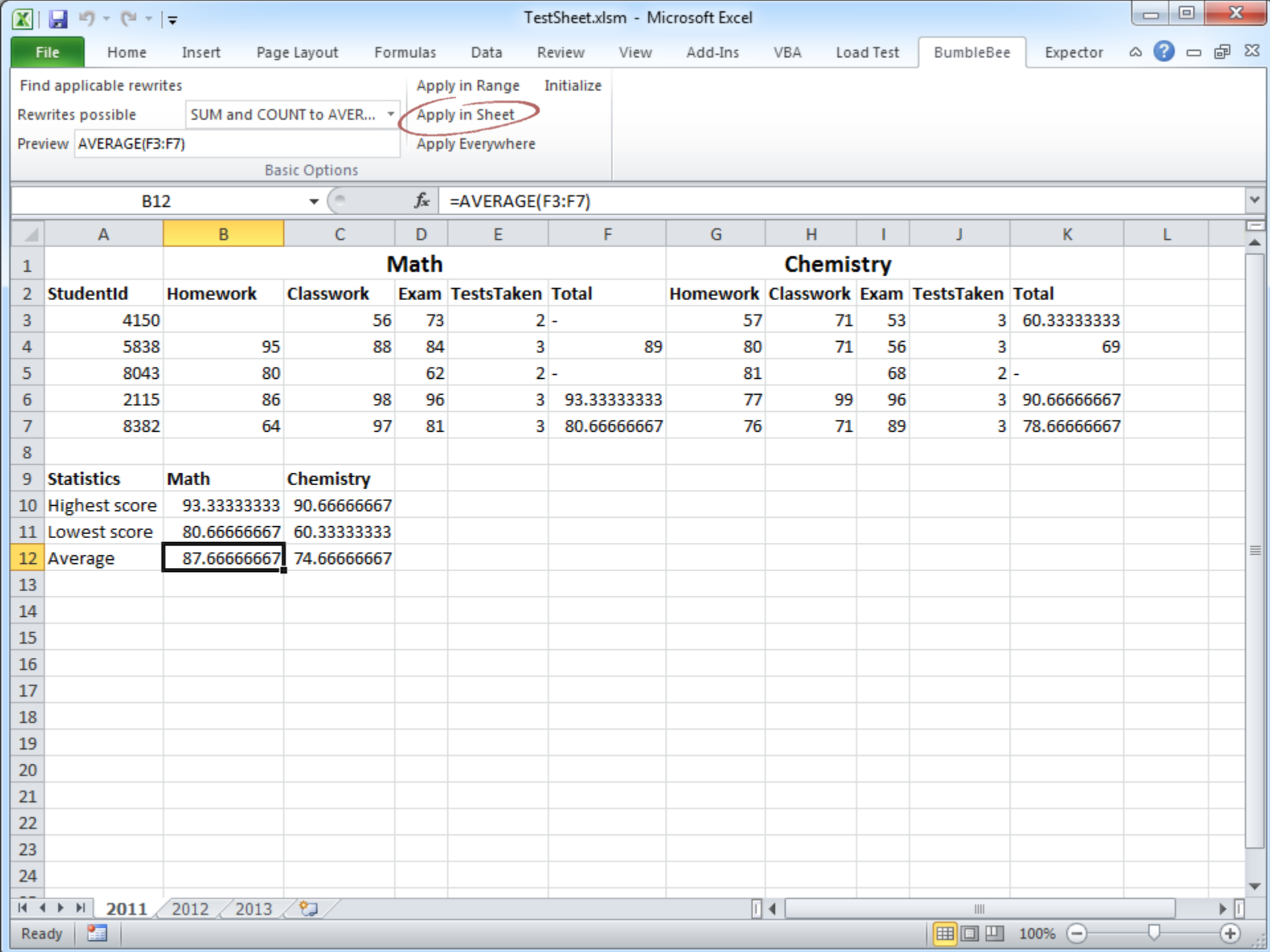

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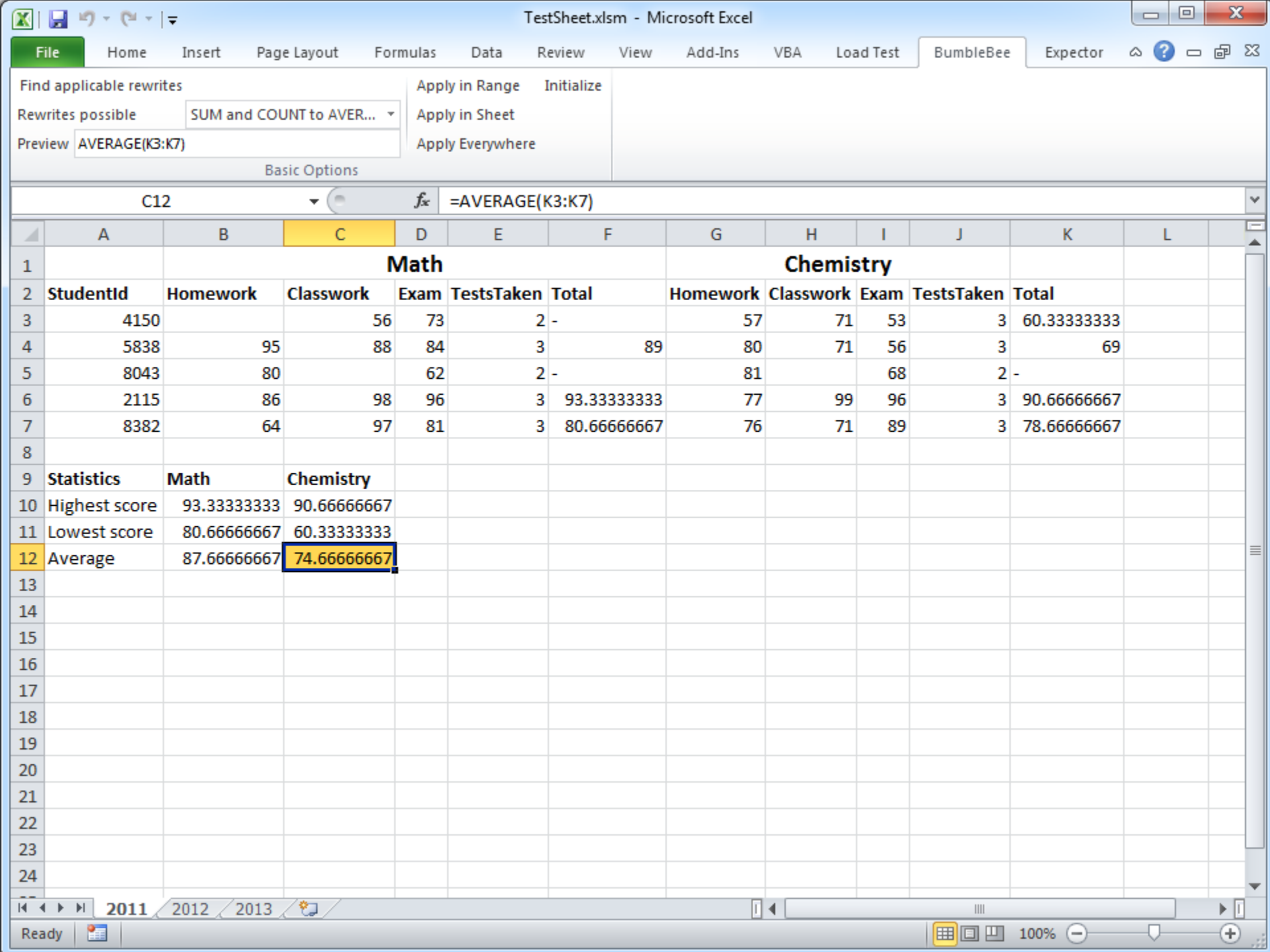
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5838 95 88 84 3 89 80 71 56 3 69
8043 80 62 2 - 81 68 2 -
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Chemistry
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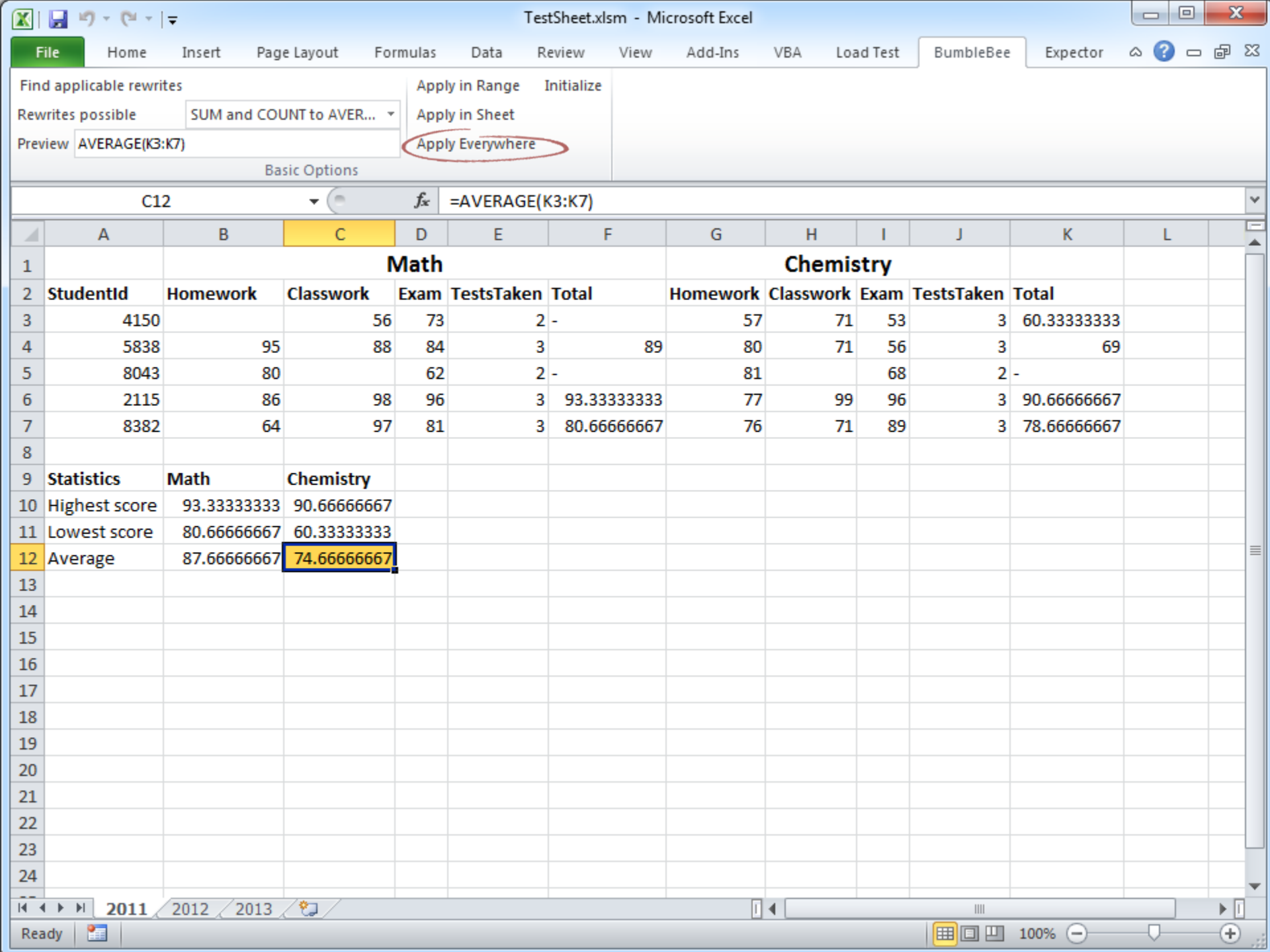

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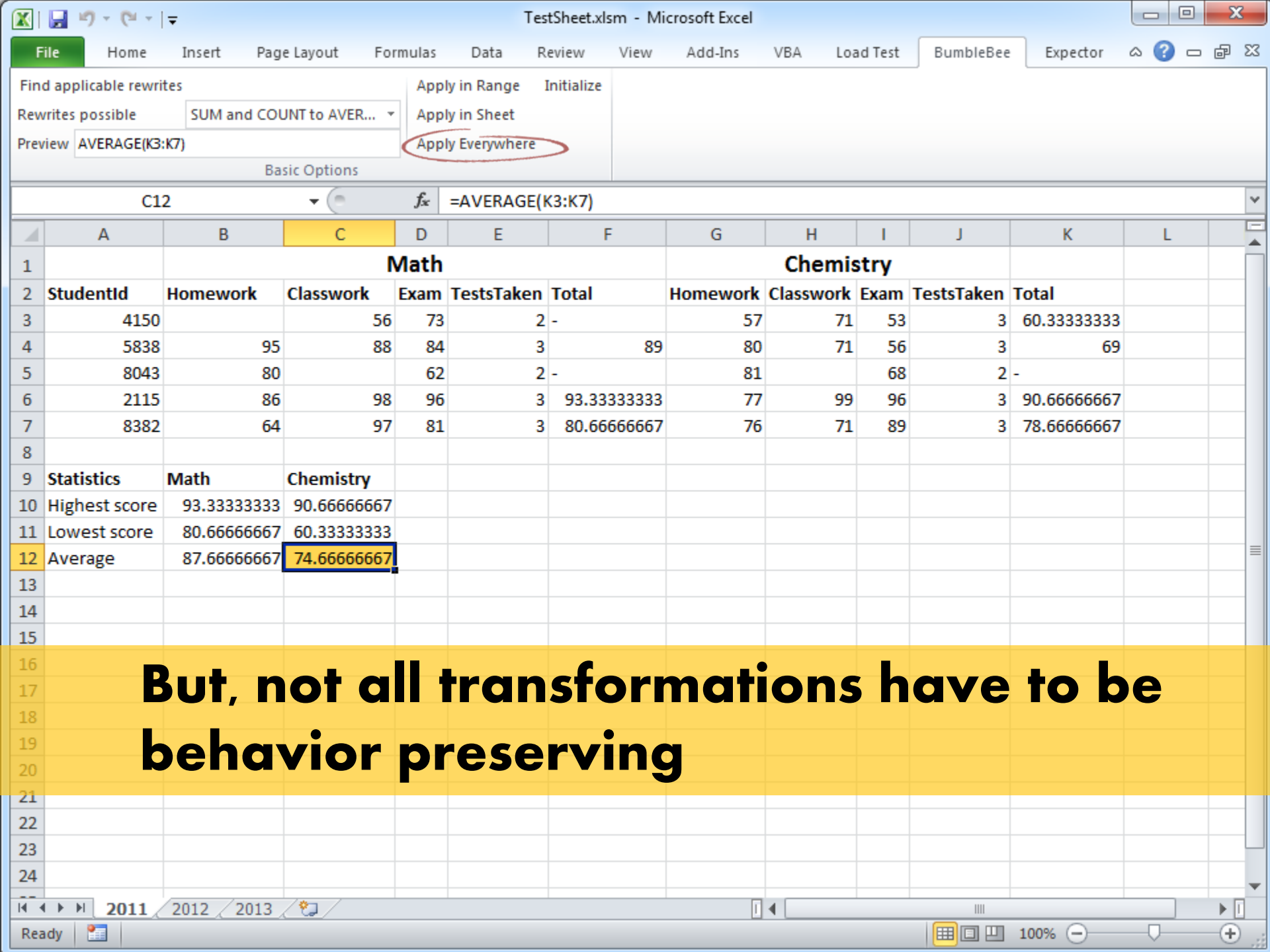

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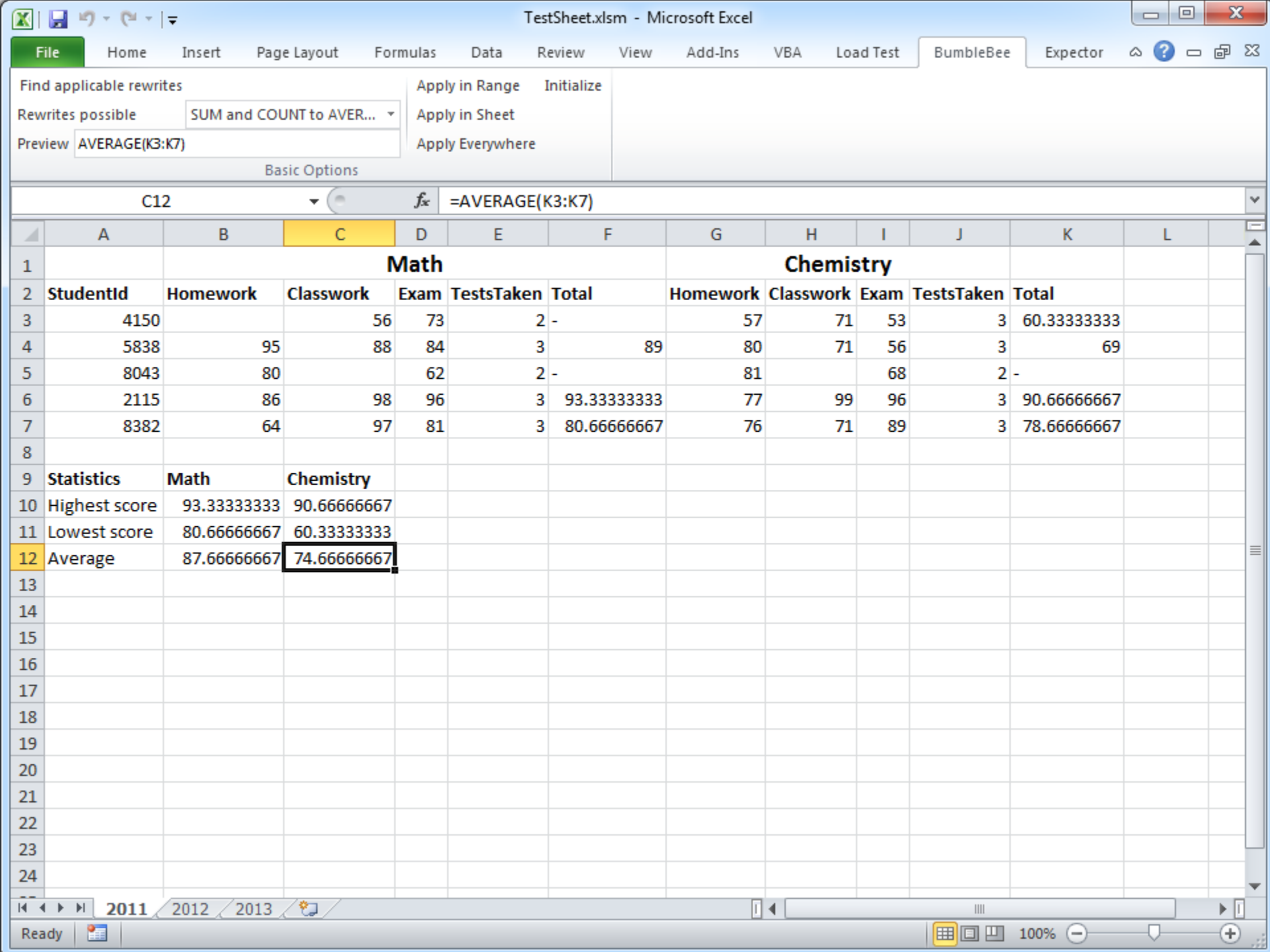

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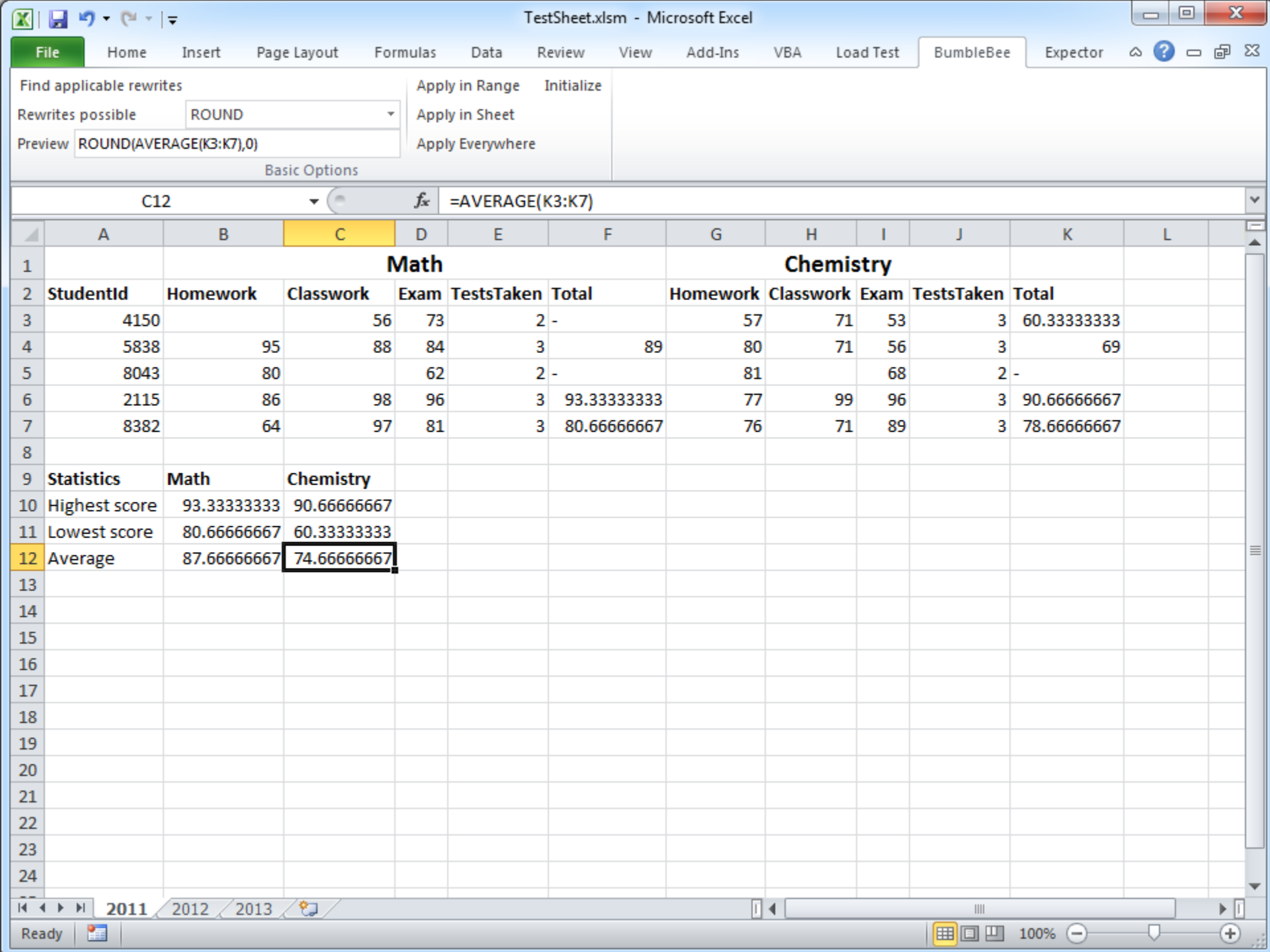

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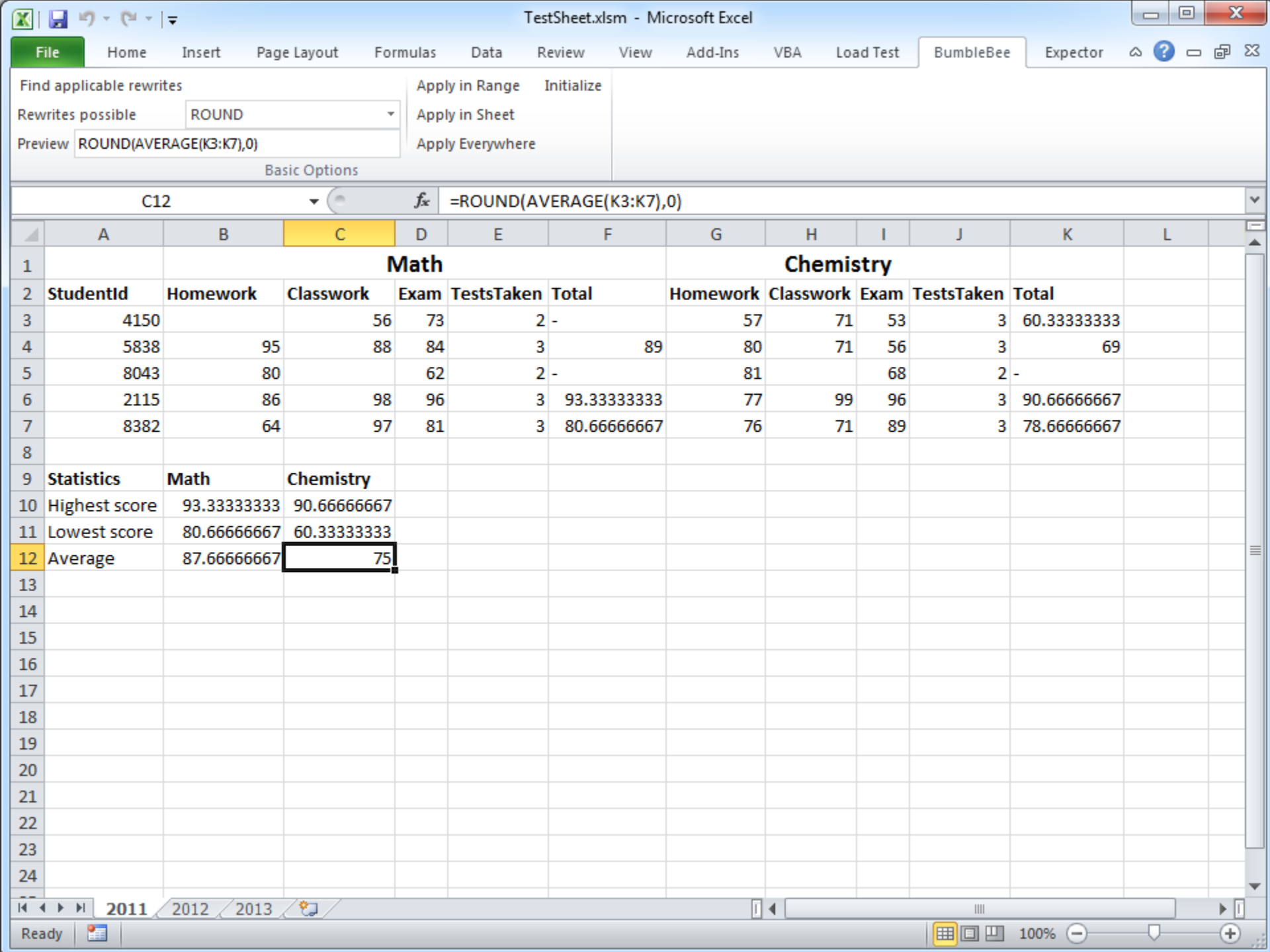
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Page Layout
Formulas
Data
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View
Add-Ins
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4150 56 73 2 - 57 71 53 3 60.33333333
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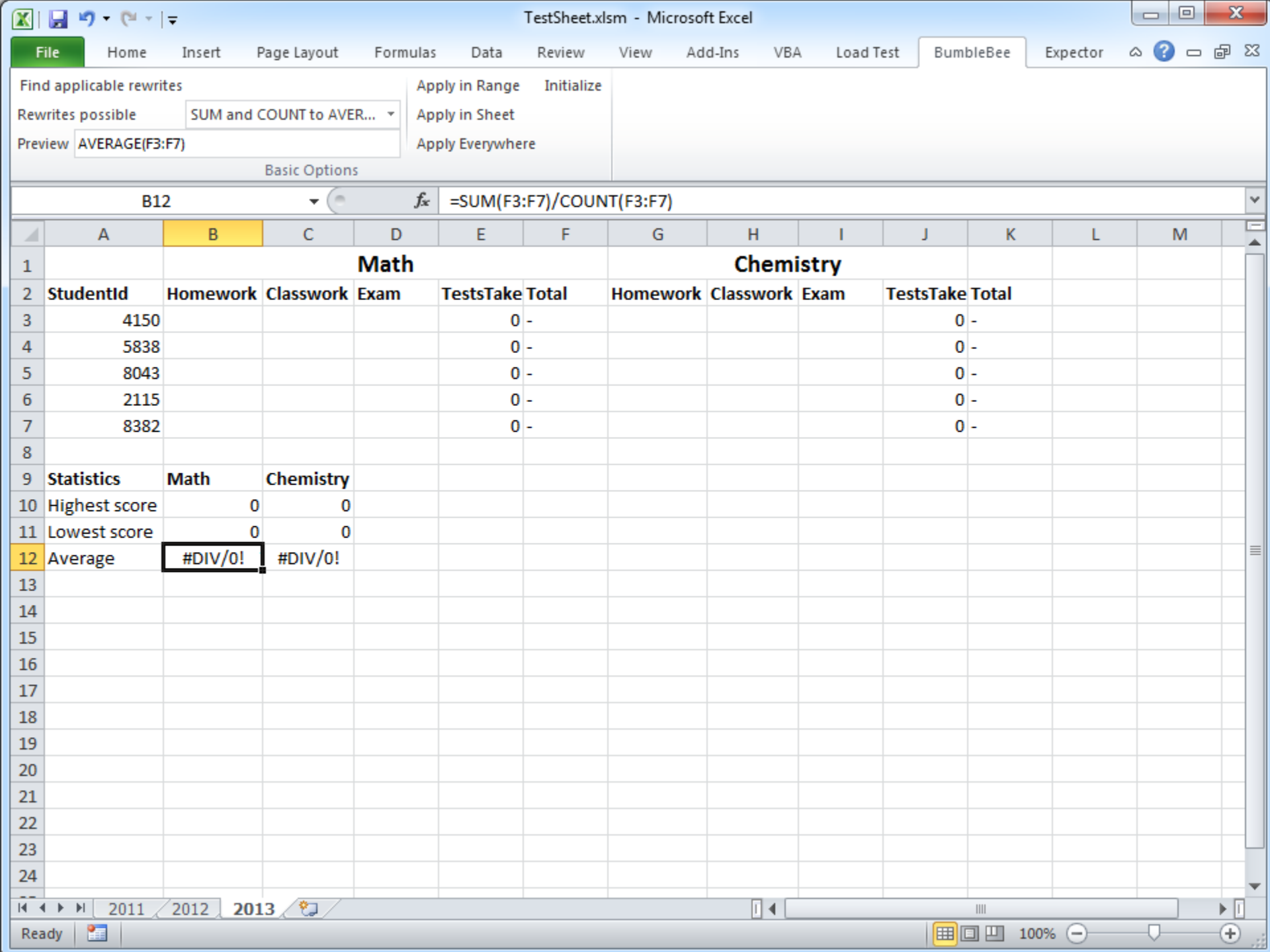

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5	8043				0	-				0	-		
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7	8382				0	-				0	-		
8													
9	Statistics	Math	Chemistry										
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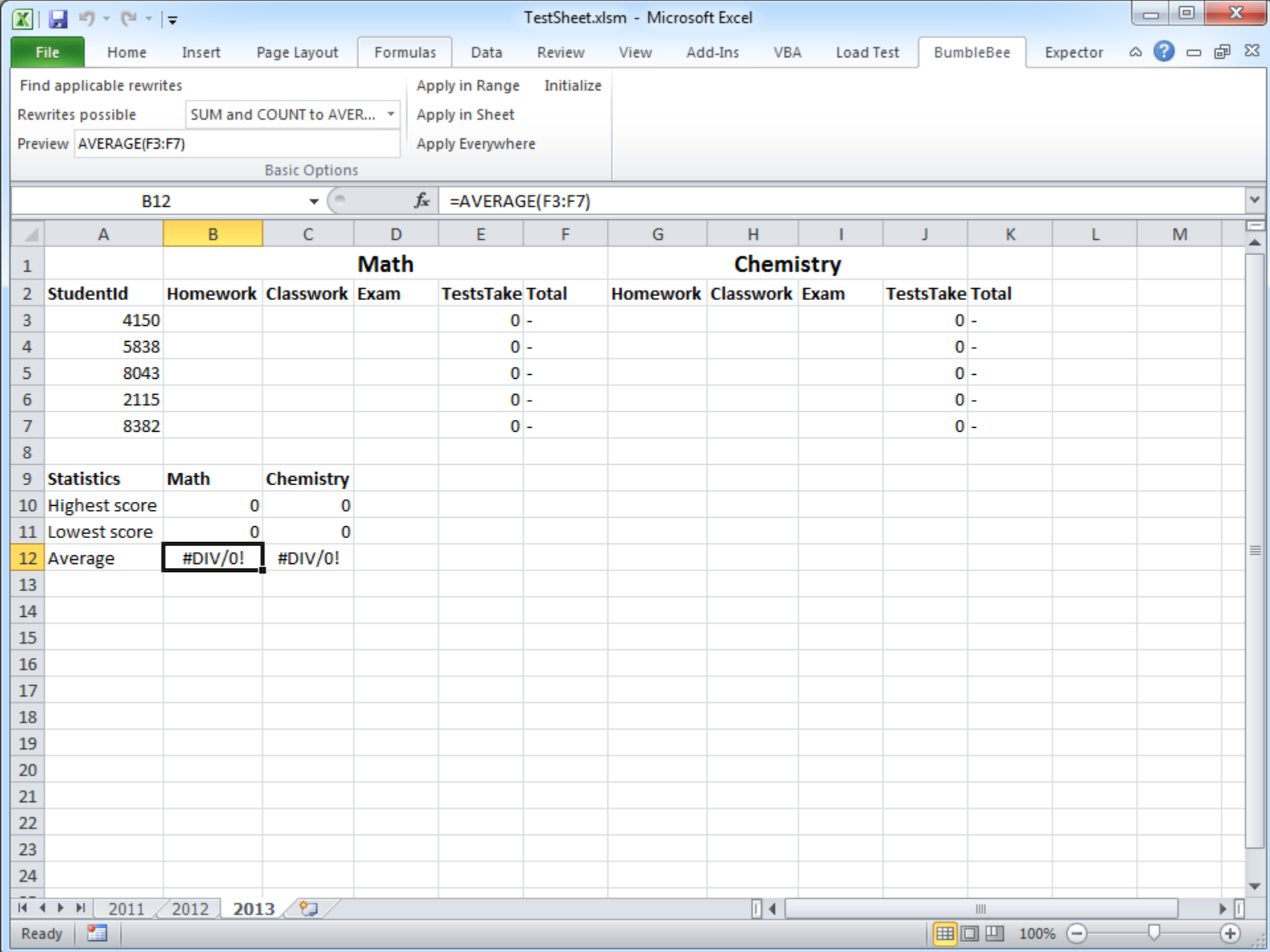

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3	4150				0	-				0	-		
4	5838				0	-				0	-		
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6	2115				0	-				0	-		
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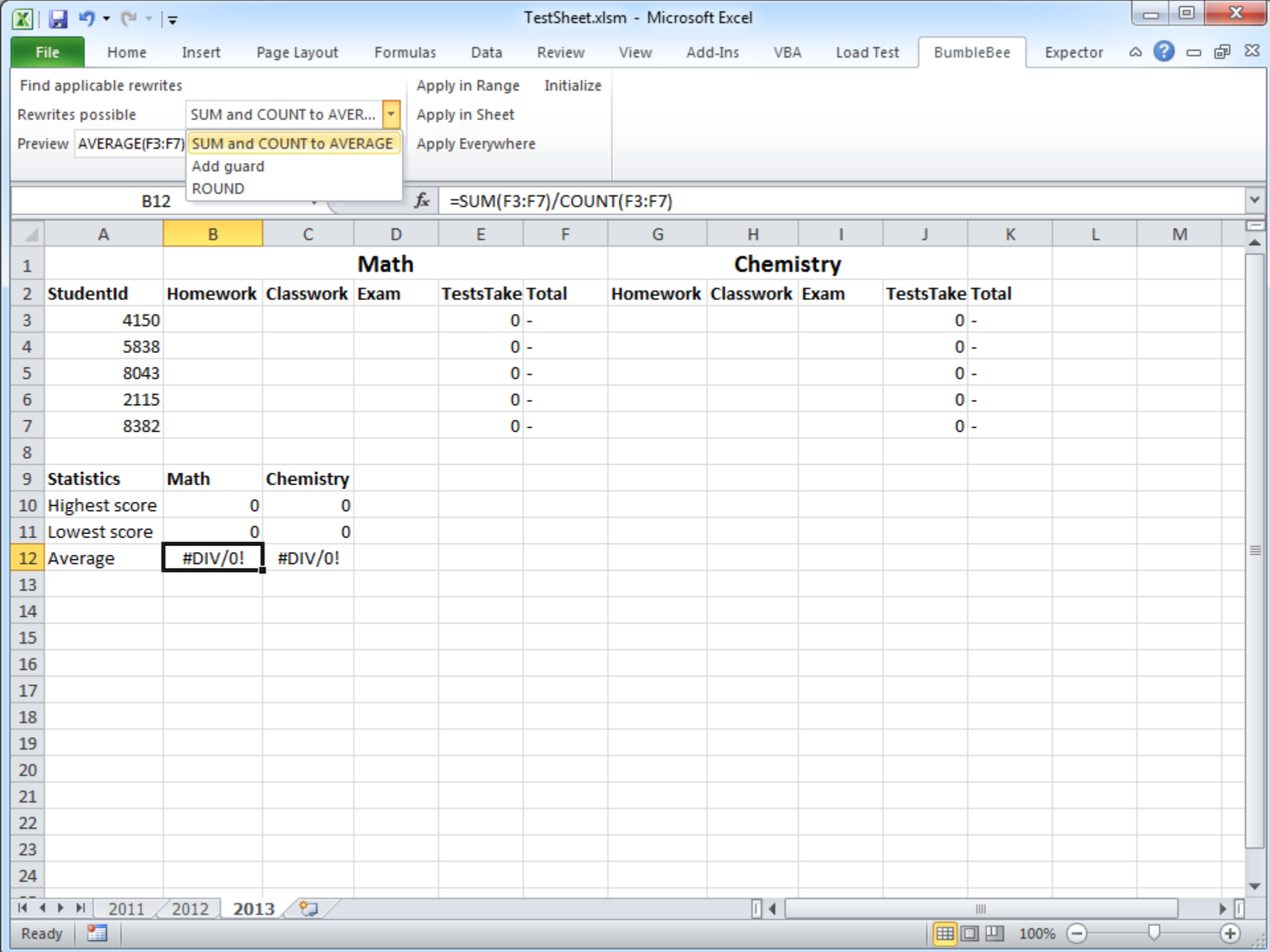
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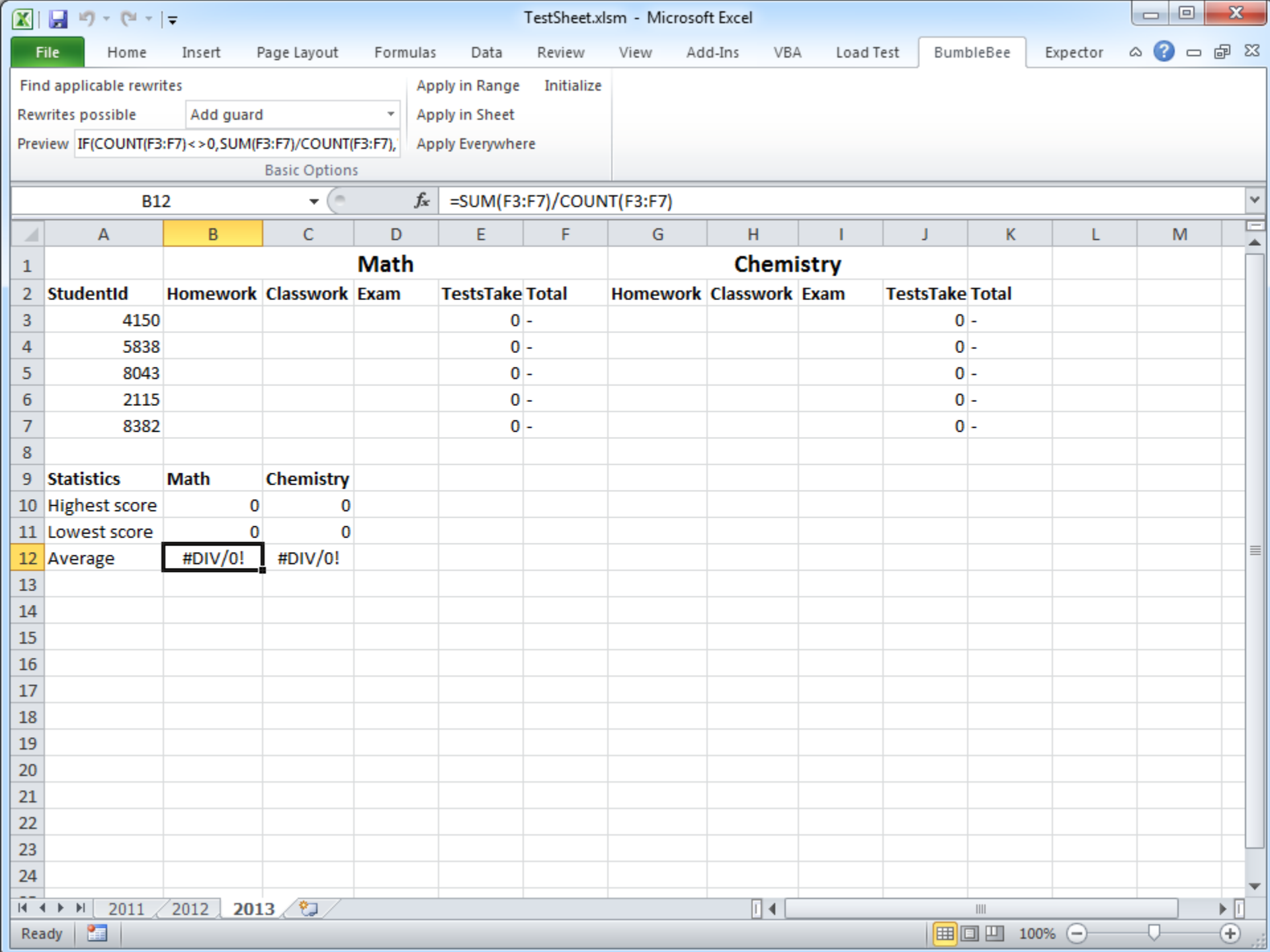
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IF(COUNT(F3:F7)<>0,SUM(F3:F7)/COUNT(F3:F7),
Basic Options
Apply in Range
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B12
=SUM(F3:F7)/COUNT(F3:F7)
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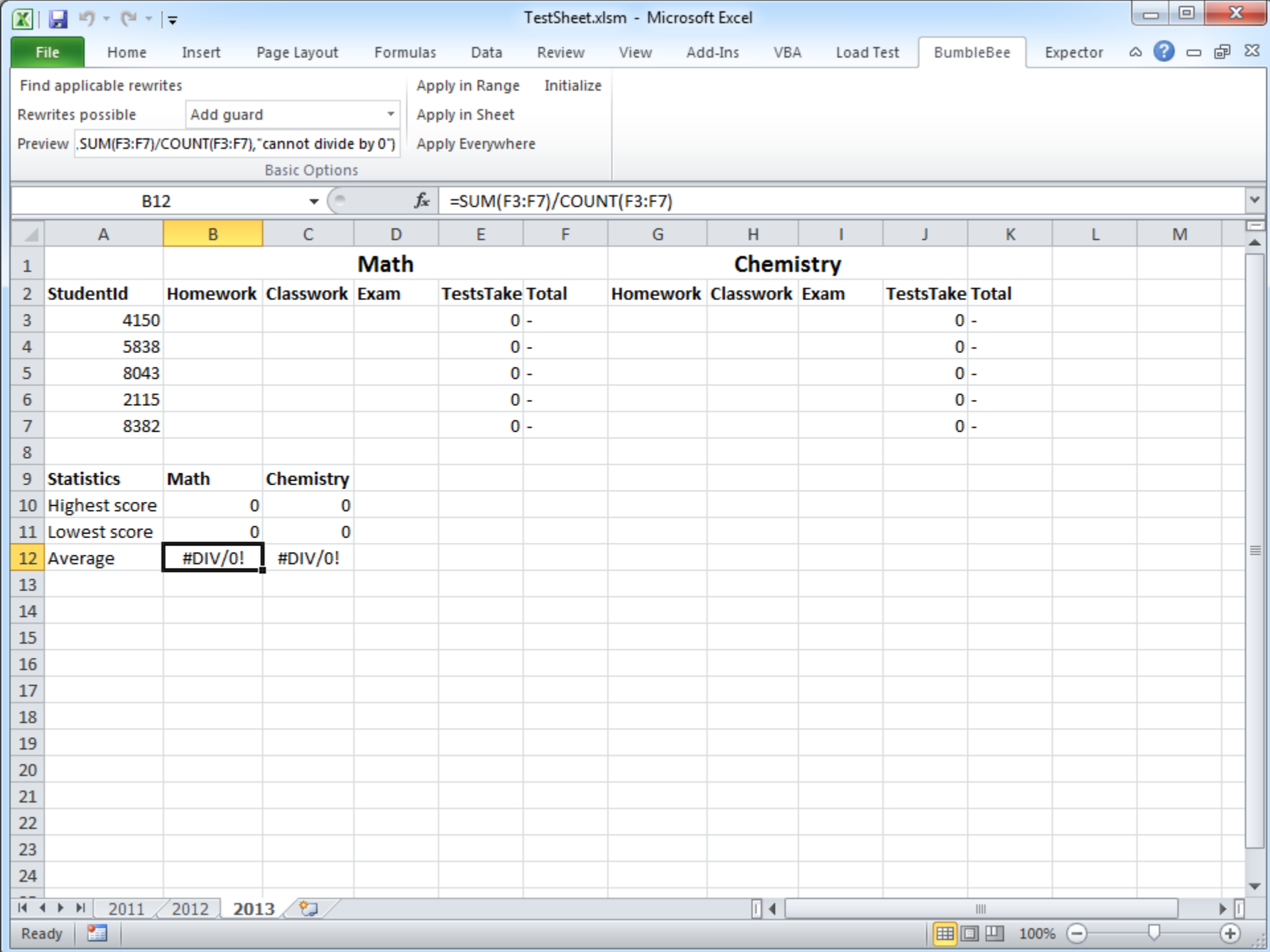

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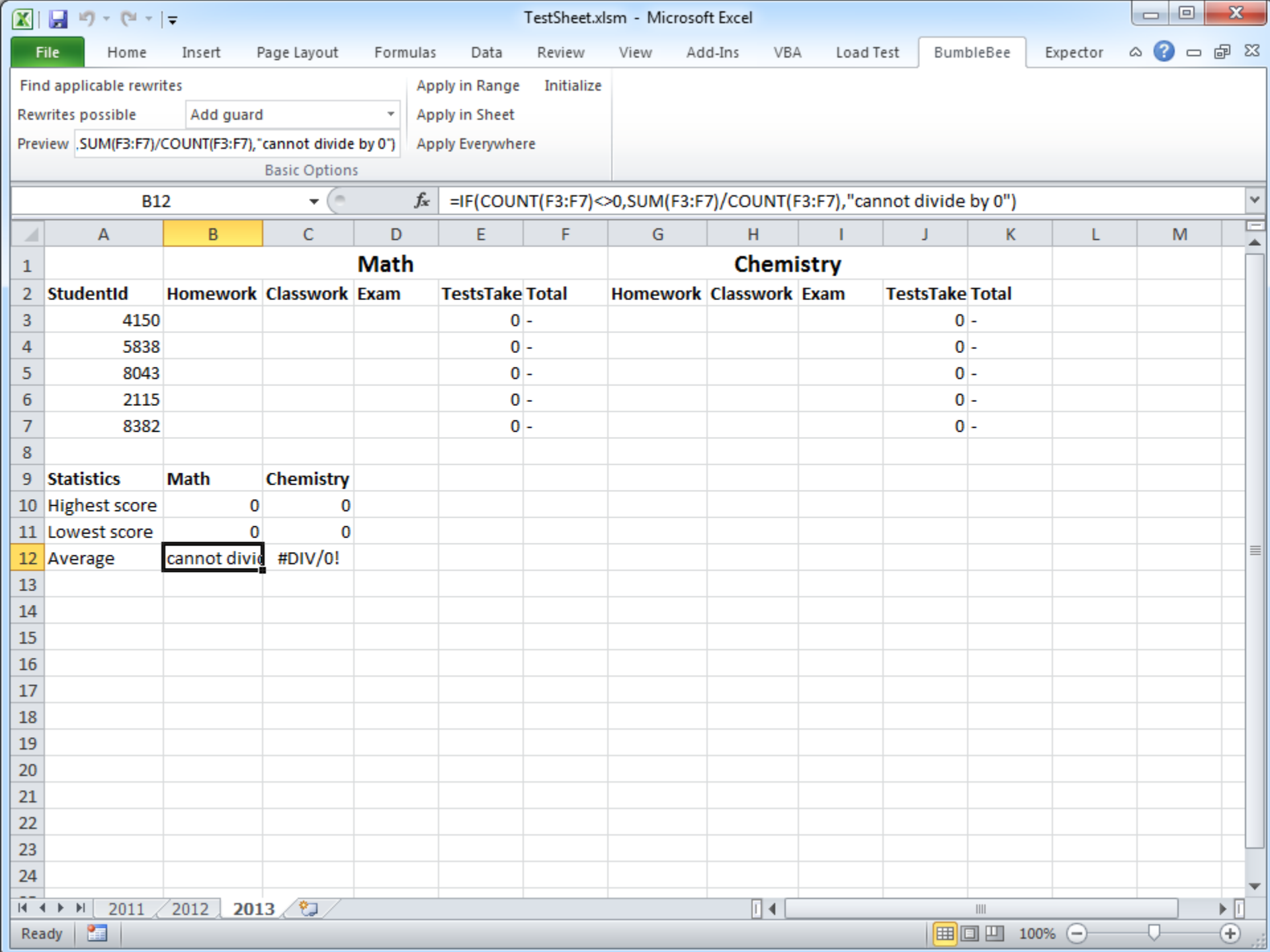
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Rewrites possible
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,SUM(F3:F7)/COUNT(F3:F7),"cannot divide by 0")
Basic Options
Apply in Range
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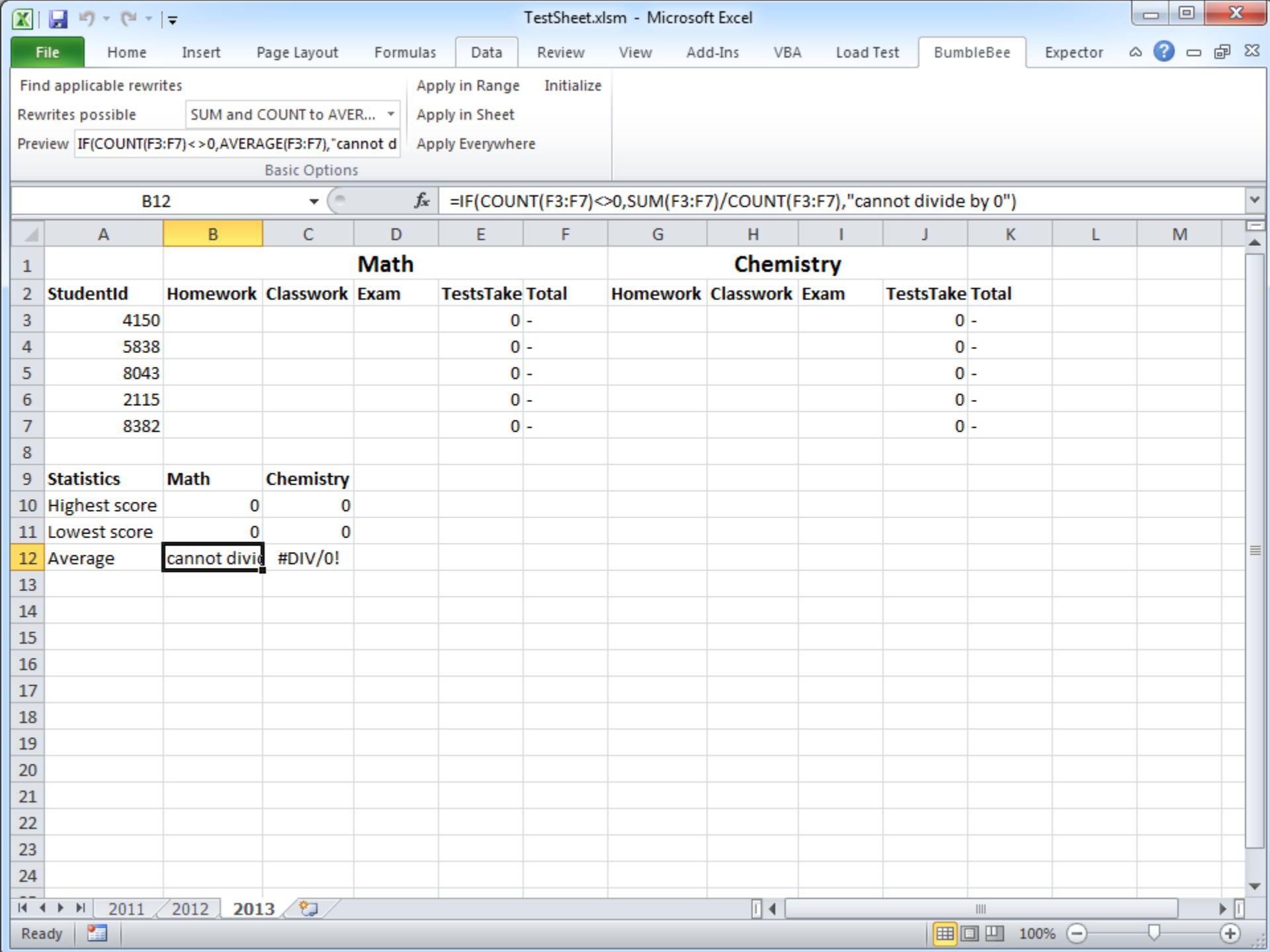
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Apply Everywhere
B12
=IF(COUNT(F3:F7)<>0,SUM(F3:F7)/COUNT(F3:F7),"cannot divide by 0")
Math
Chemistry
StudentId
Homework
Classwork
Exam
TestsTake
Total
4150
5838
8043
2115
8382
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Math
Chemistry
Highest score
Lowest score
Average
cannot divi
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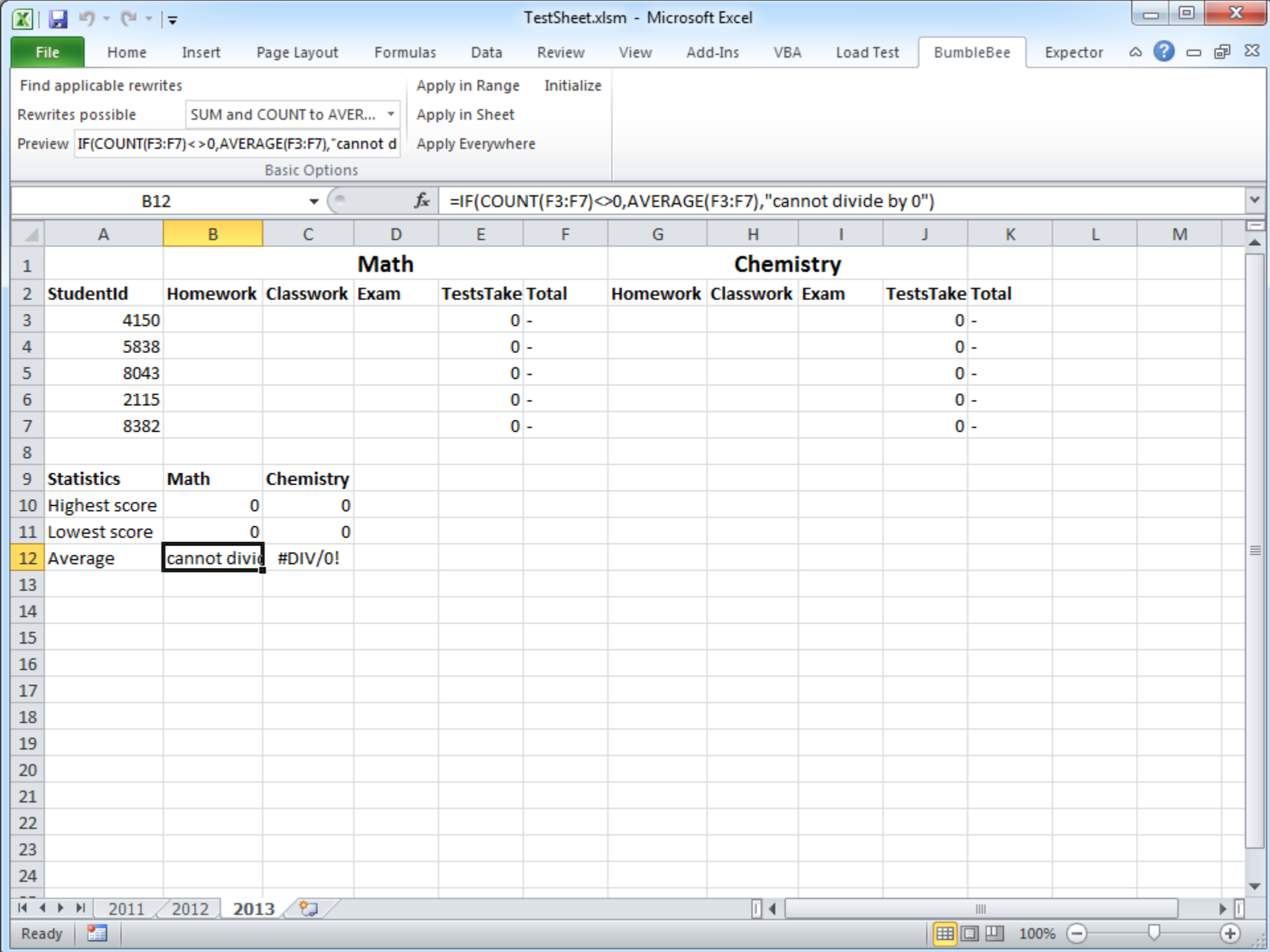
2012
2013
Ready
100%


TestSheet.xlsm - Microsoft Excel
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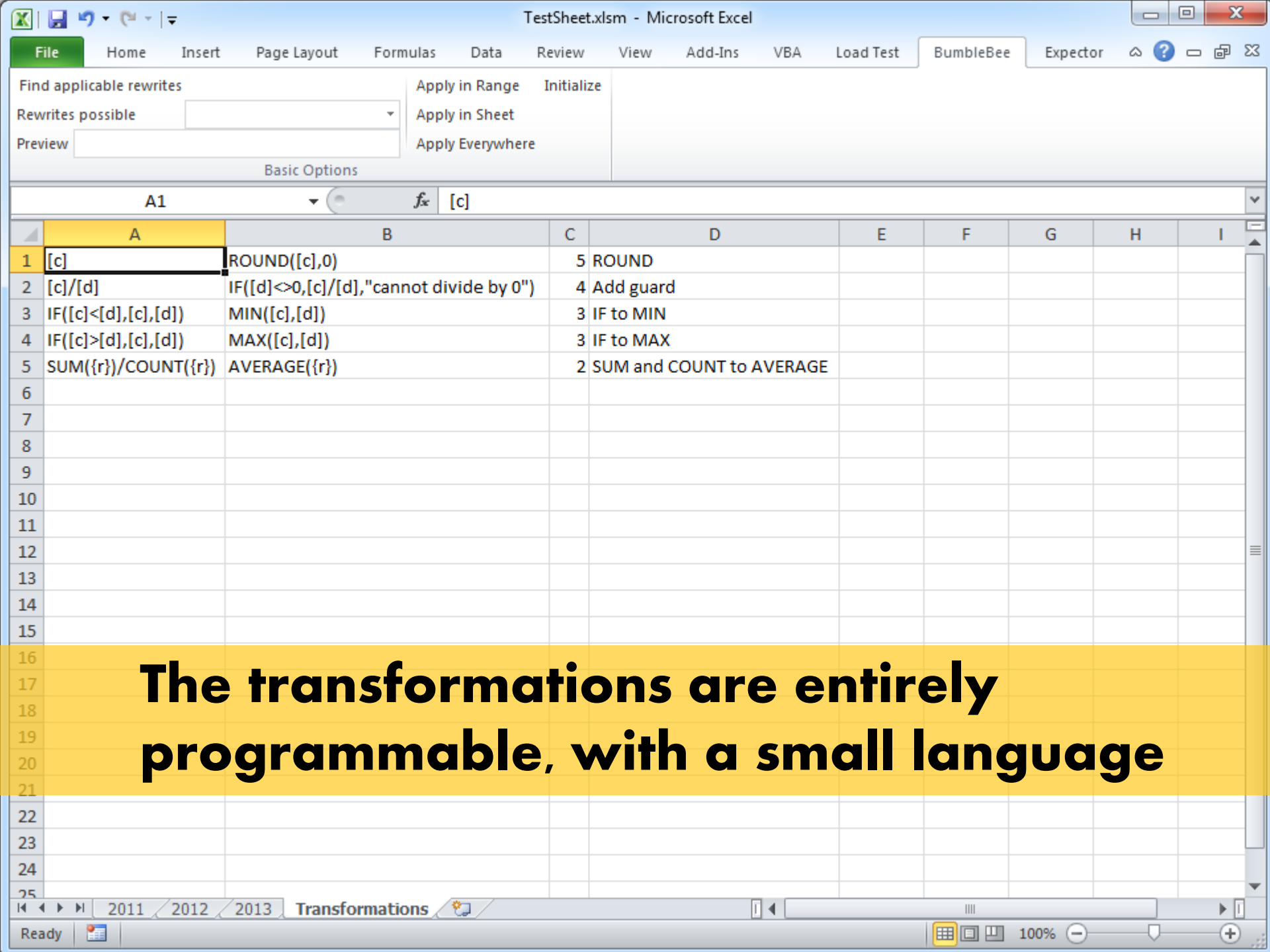

The transformations are entirely programmable, with a small language

New paper: BumbleBee, a

www.felienne.com/?p=2964

Felienne's Blog

Meta

Site Admin

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New paper: BumbleBee, a tool for spreadsheet formula transformations

Some spreadsheets can be improved

While looking at spreadsheet and how they are used, over the past years I have noticed that many users don't make their spreadsheets as easy as they could be. For instance, they use A1+A2+A3+A4+A5 instead of the simpler SUM(A1:A5) Sometimes because they are unaware of a simpler construct, or because the spreadsheet evolved over time. For instance, in used to be A1+A2, then A3 was added and so forth. Such complex formulas were exactly the aim of our previous work on smell detection.

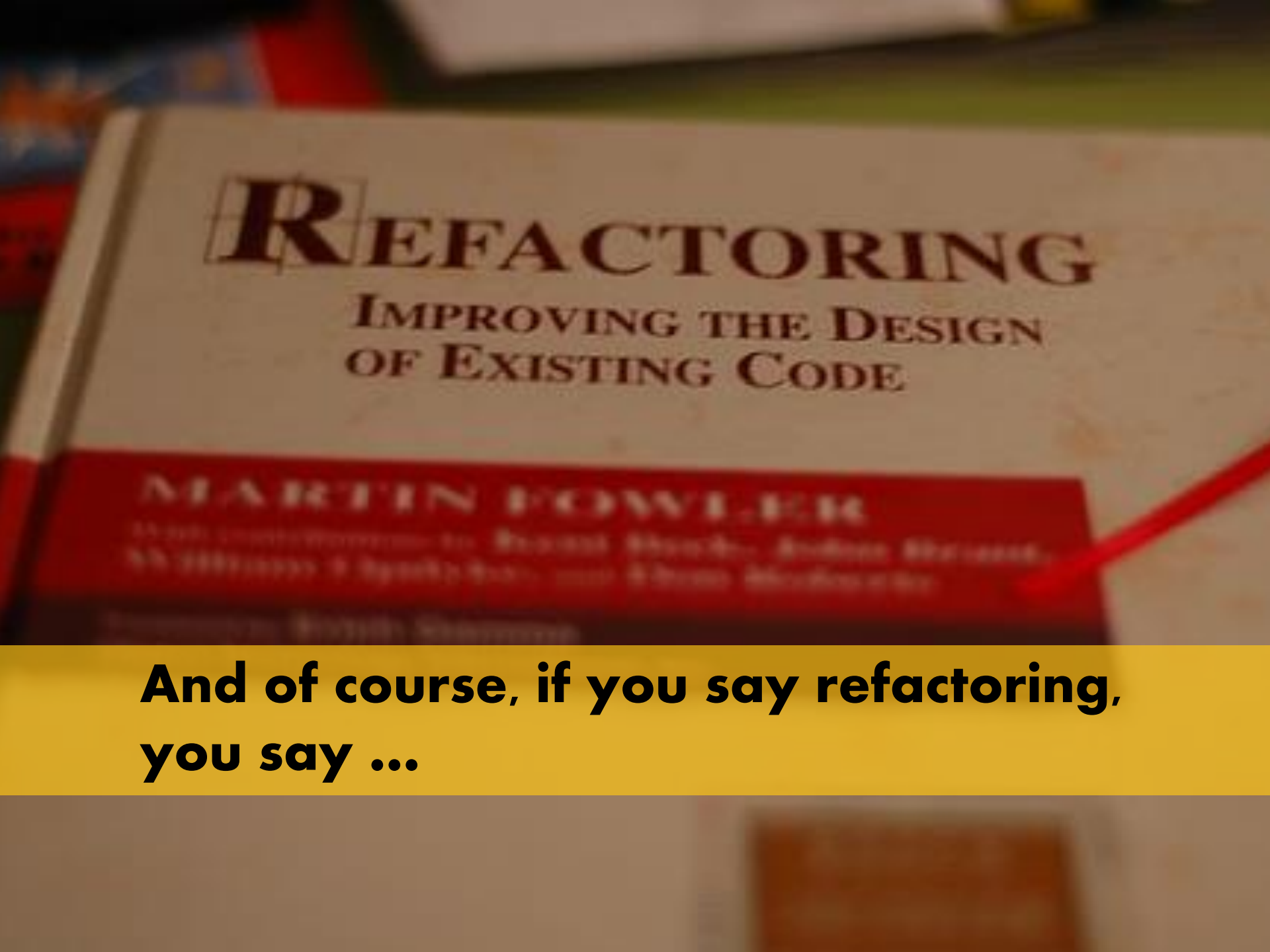
If you say smell, you say.... refactorings!

About Felienne

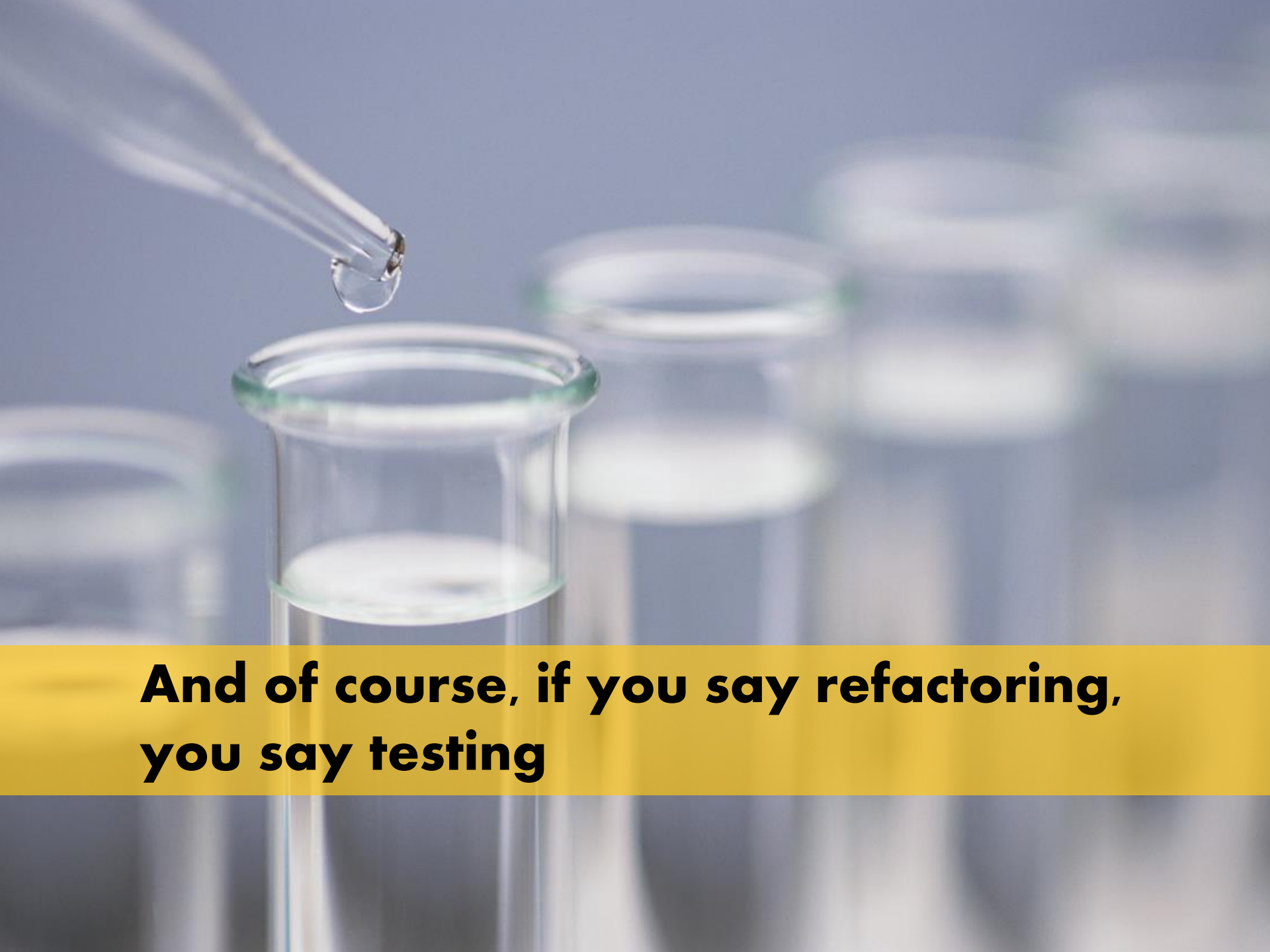
Recent Comments

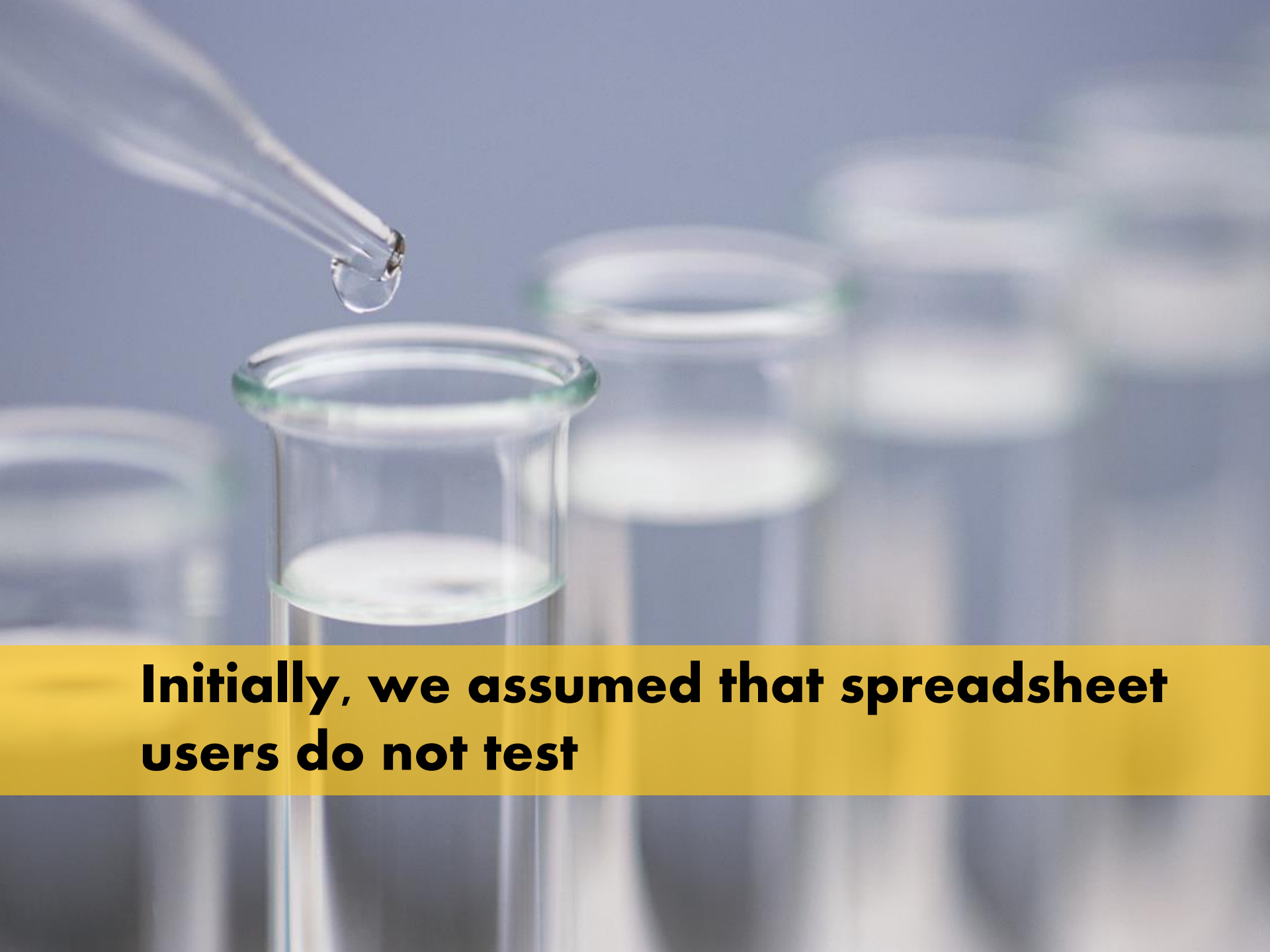
Tags

You can download BumbleBee from my website (felienne.com)



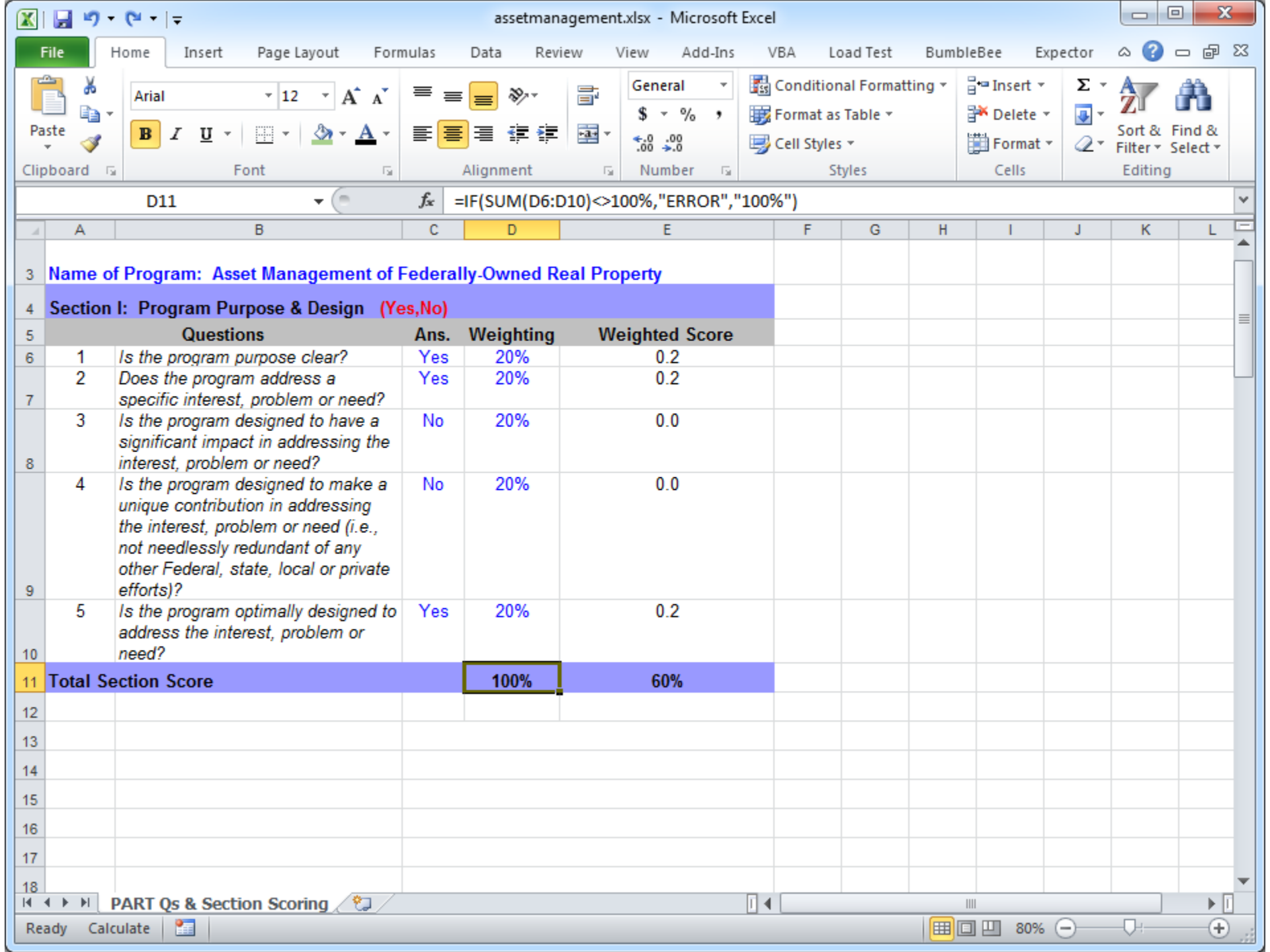
And of course, if you say refactoring, you say ...


And of course, if you say refactoring,
you say testing



Initially, we assumed that spreadsheet users do not test

But, spreadsheets tests are hiding in plain sight


assetmanagement.xlsx - Microsoft Excel
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Find & Select
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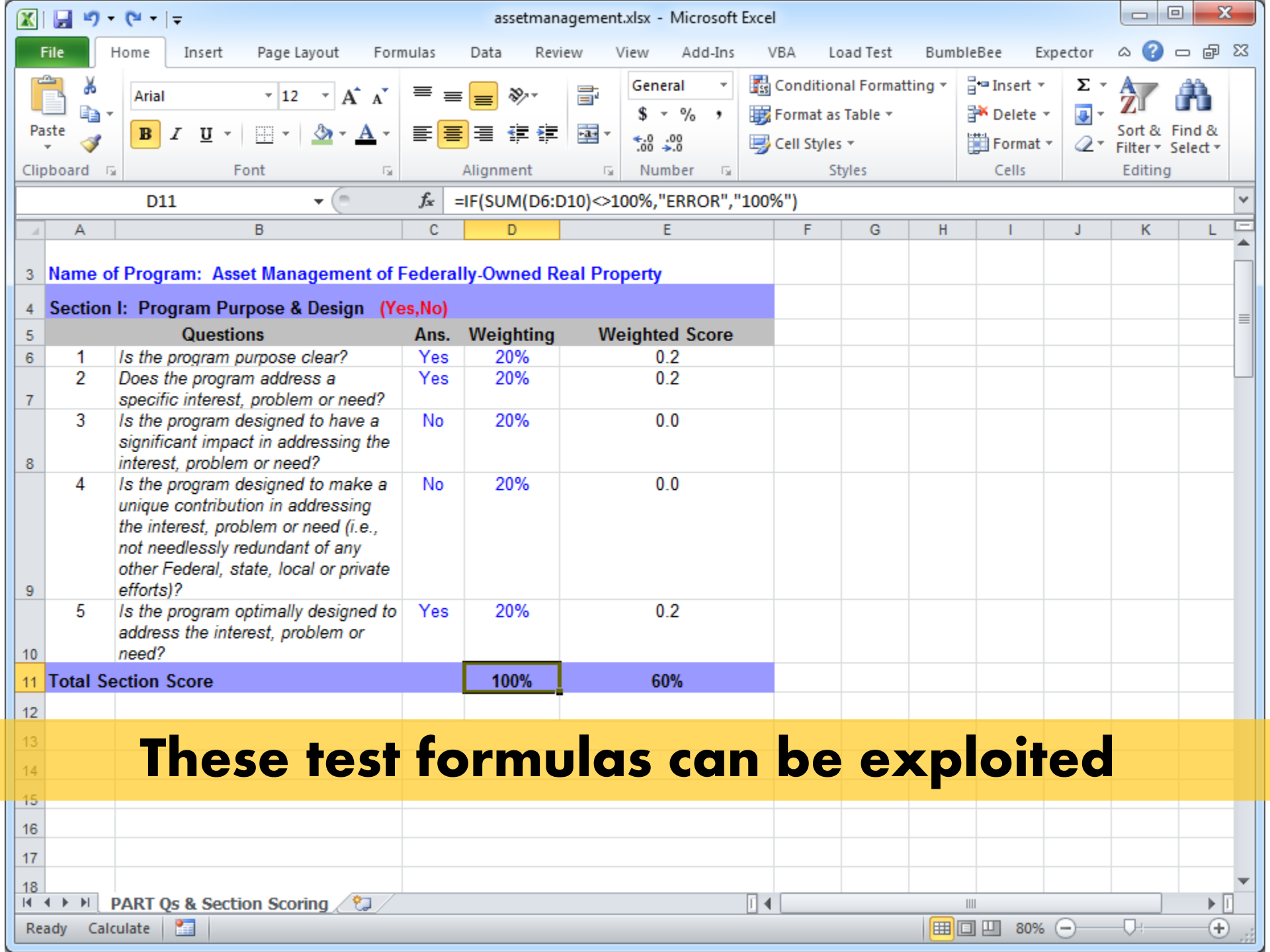
D11
=IF(SUM(D6:D10)<>100%,"ERROR","100%")
Name of Program: Asset Management of Federally-Owned Real Property
Section I: Program Purpose & Design (Yes,No)
Questions
Ans.
Weighting
Weighted Score
1 Is the program purpose clear? Yes 20% 0.2
2 Does the program address a specific interest, problem or need? Yes 20% 0.2
3 Is the program designed to have a significant impact in addressing the interest, problem or need? No 20% 0.0
4 Is the program designed to make a unique contribution in addressing the interest, problem or need (i.e., not needlessly redundant of any other Federal, state, local or private efforts)? No 20% 0.0
5 Is the program optimally designed to address the interest, problem or need? Yes 20% 0.2
Total Section Score 100% 60%
PART Qs & Section Scoring
Ready
Calculate
80%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Total Section Score 100% 60%
These test formulas can be exploited
PART Qs & Section Scoring
Ready
Calculate
80%

assetmanagement.xlsx - Microsoft Excel

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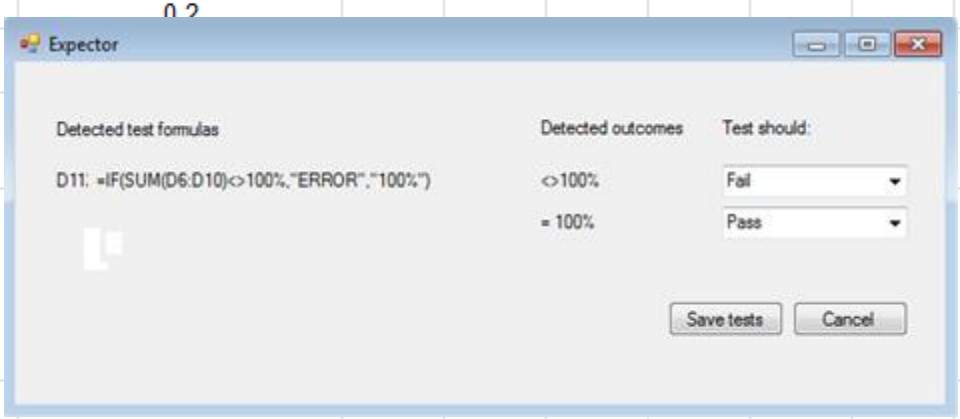
Find Tests
Mark Tests
Mark Covered Formulas
Mark Non-Covered Formulas

D11 =IF(SUM(D6:D10)<>100%,"ERROR","100%")

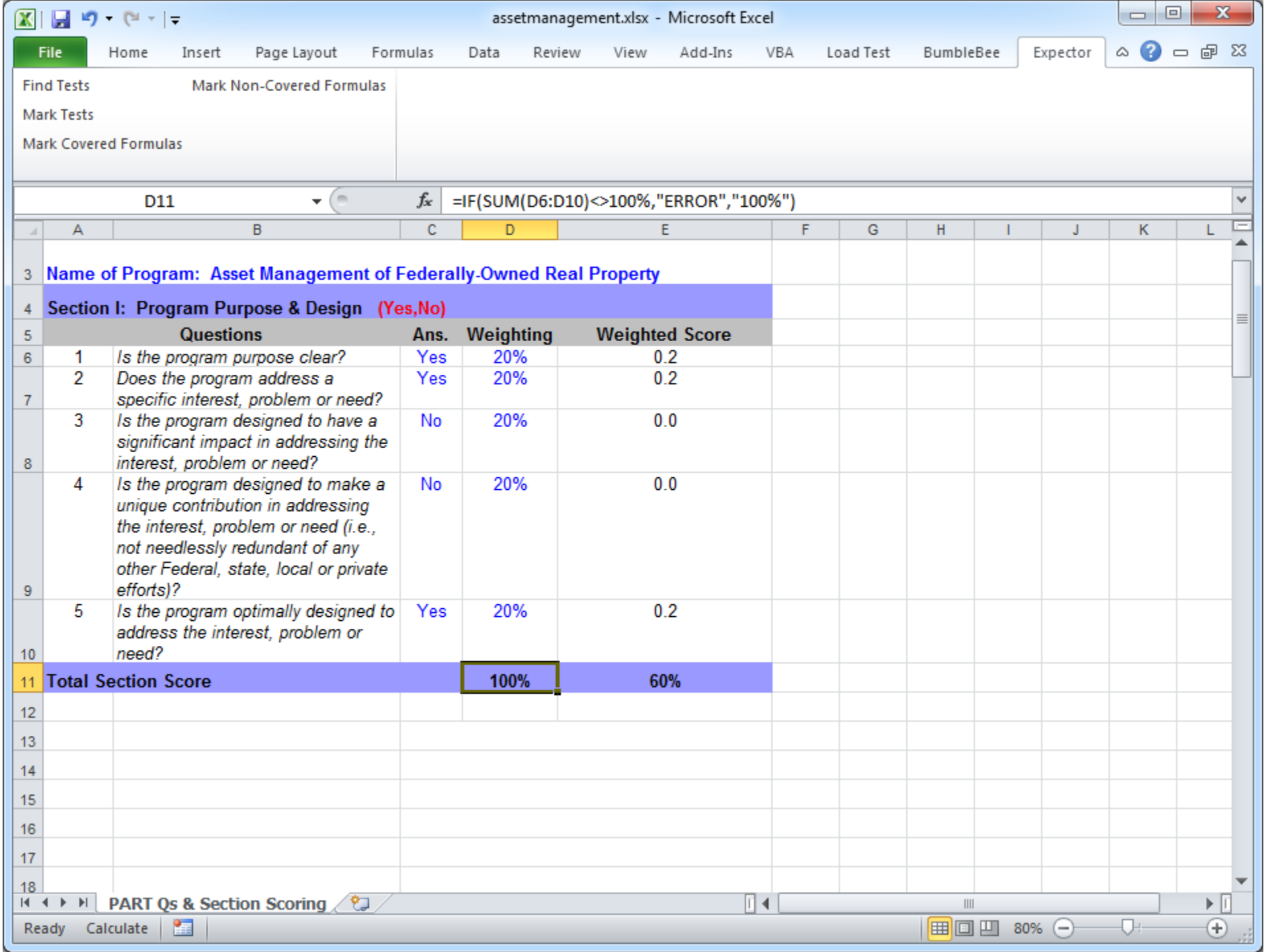
	A	B	C	D	E
3	Name of Program: Asset Management of Federally-Owned Real Property				
4	Section I: Program Purpose & Design (Yes,No)				
5		Questions	Ans.	Weighting	Weighted Score
6	1	*Is the program purpose clear?*	Yes	20%	0.2
7	2	*Does the program address a specific interest, problem or need?*	Yes	20%	
8	3	*Is the program designed to have a significant impact in addressing the interest, problem or need?*	No	20%	
9	4	*Is the program designed to make a unique contribution in addressing the interest, problem or need (i.e., not needlessly redundant of any other Federal, state, local or private efforts)?*	No	20%	
10	5	*Is the program optimally designed to address the interest, problem or need?*	Yes	20%	
11	Total Section Score			100%	60%



Our tool Expector can find test formulas

PART Qs & Section Scoring

Ready Calculate 80%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Total Section Score 100% 60%
PART Qs & Section Scoring
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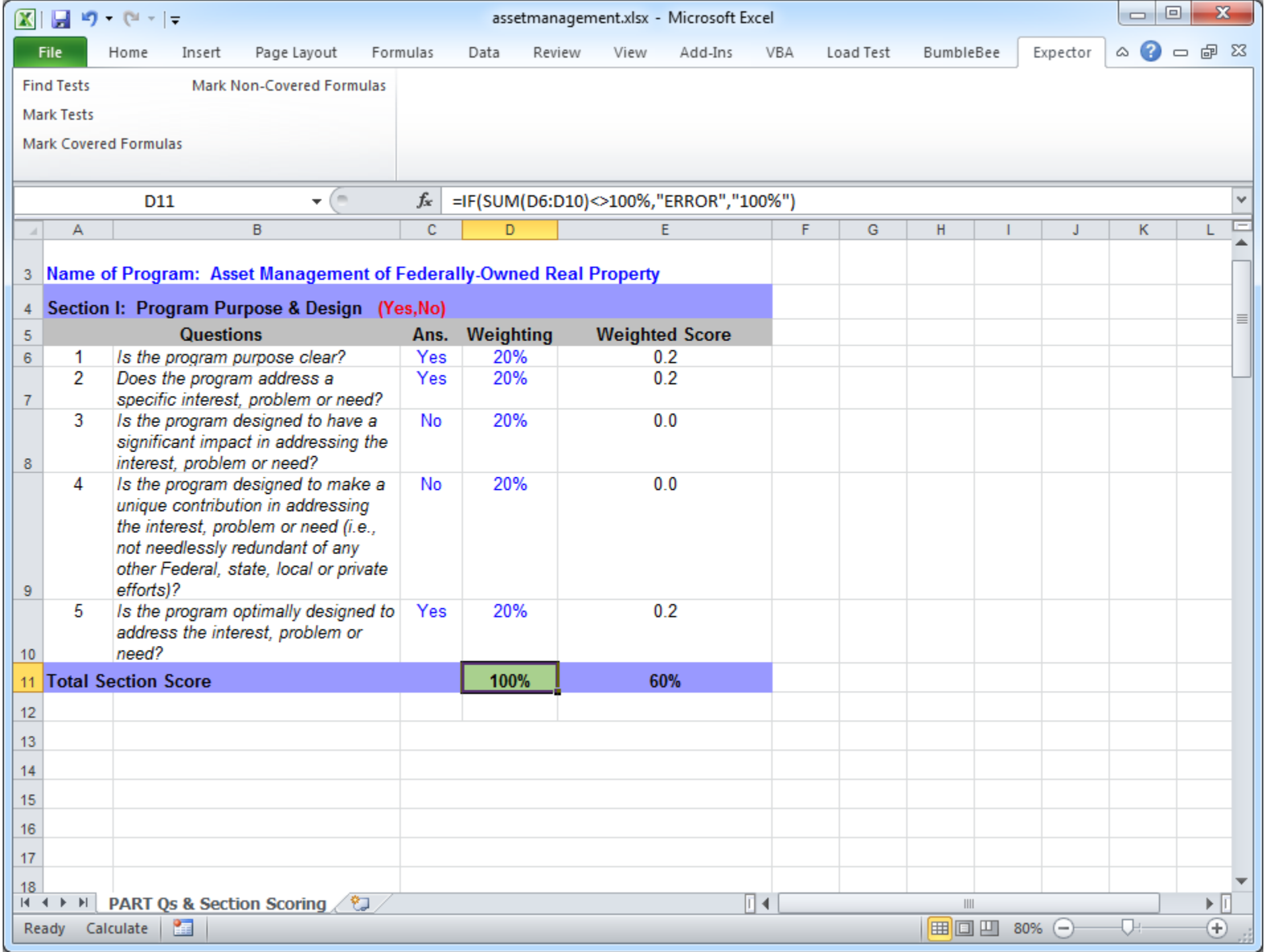
80%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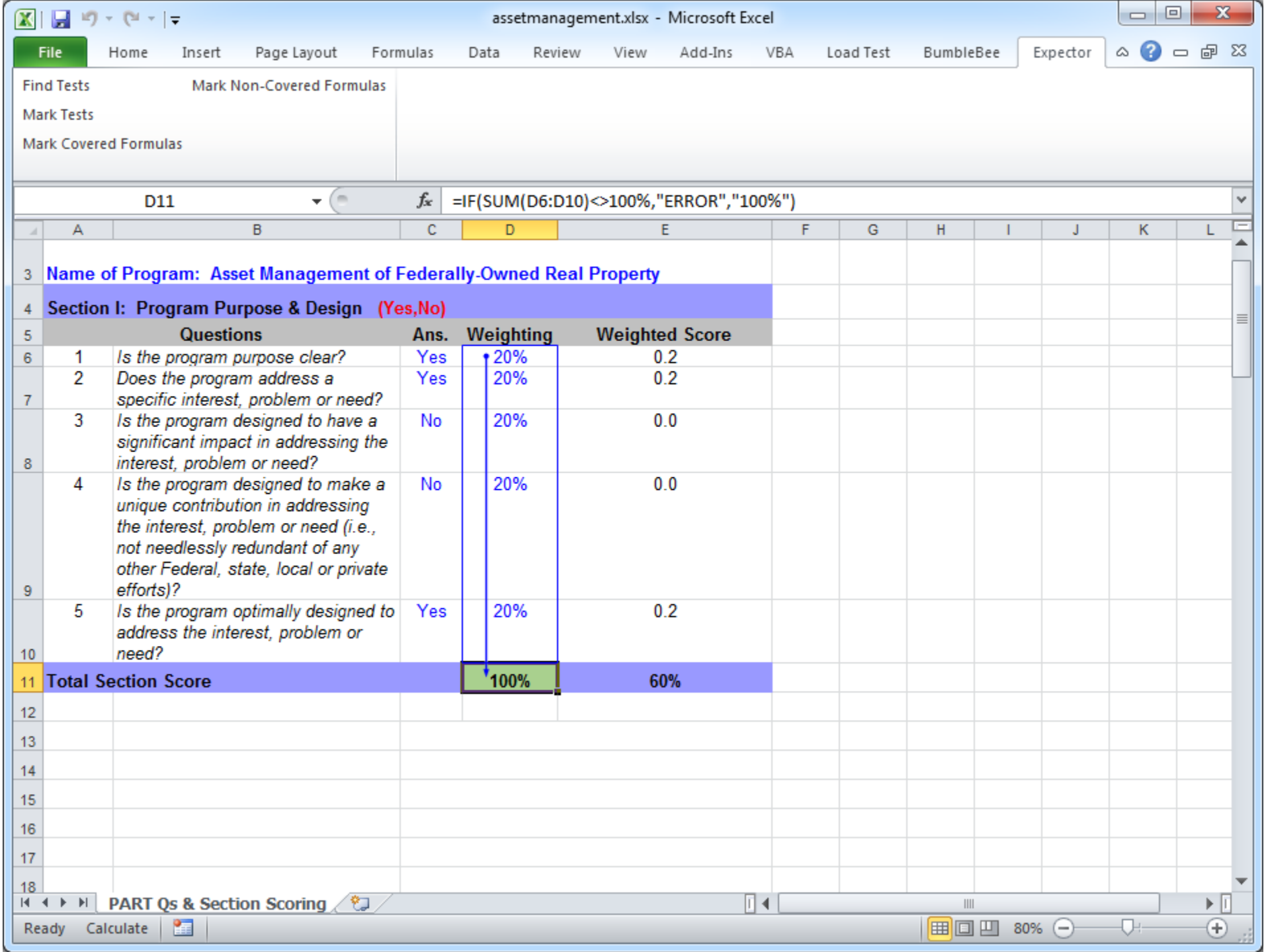
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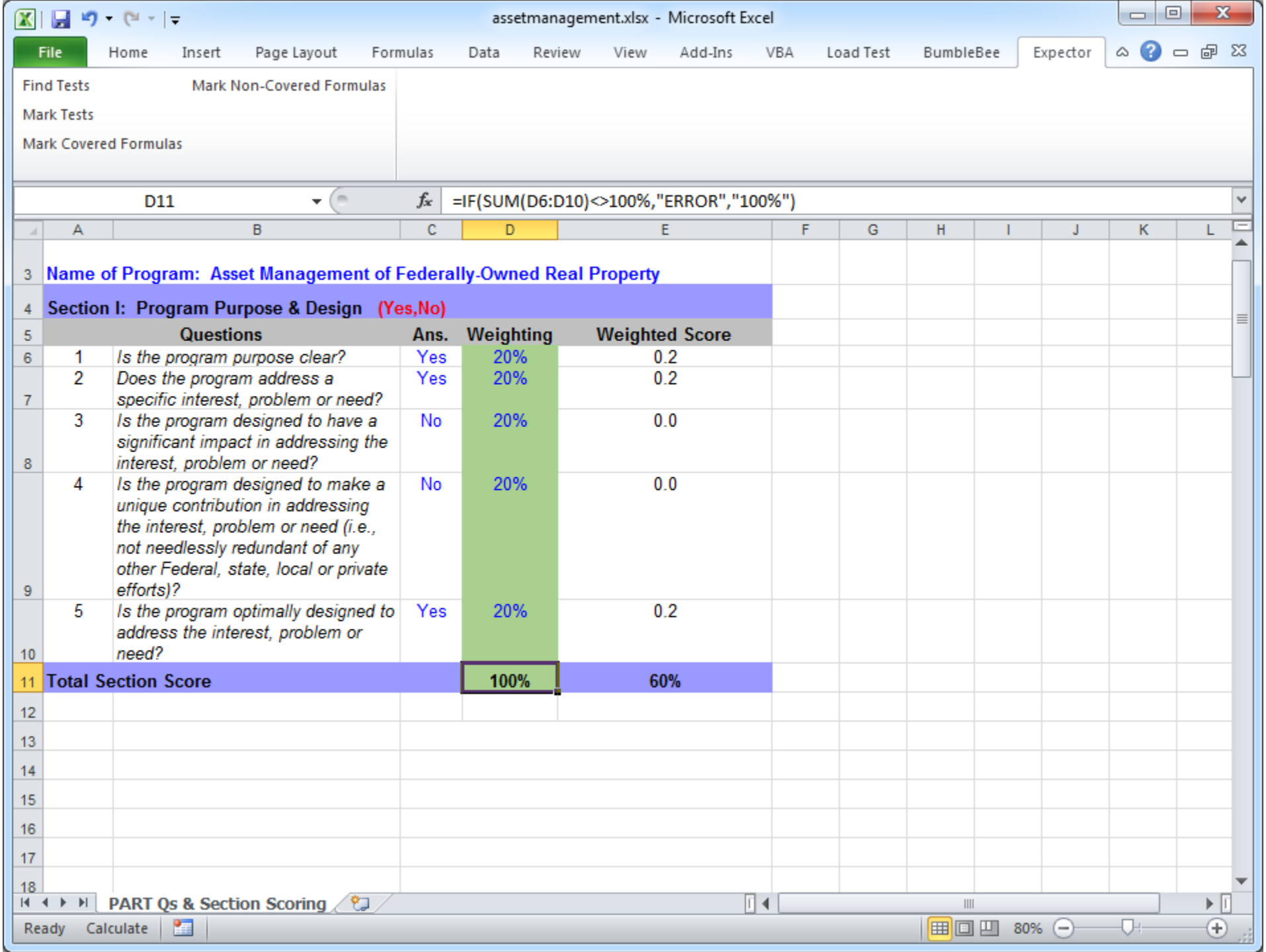
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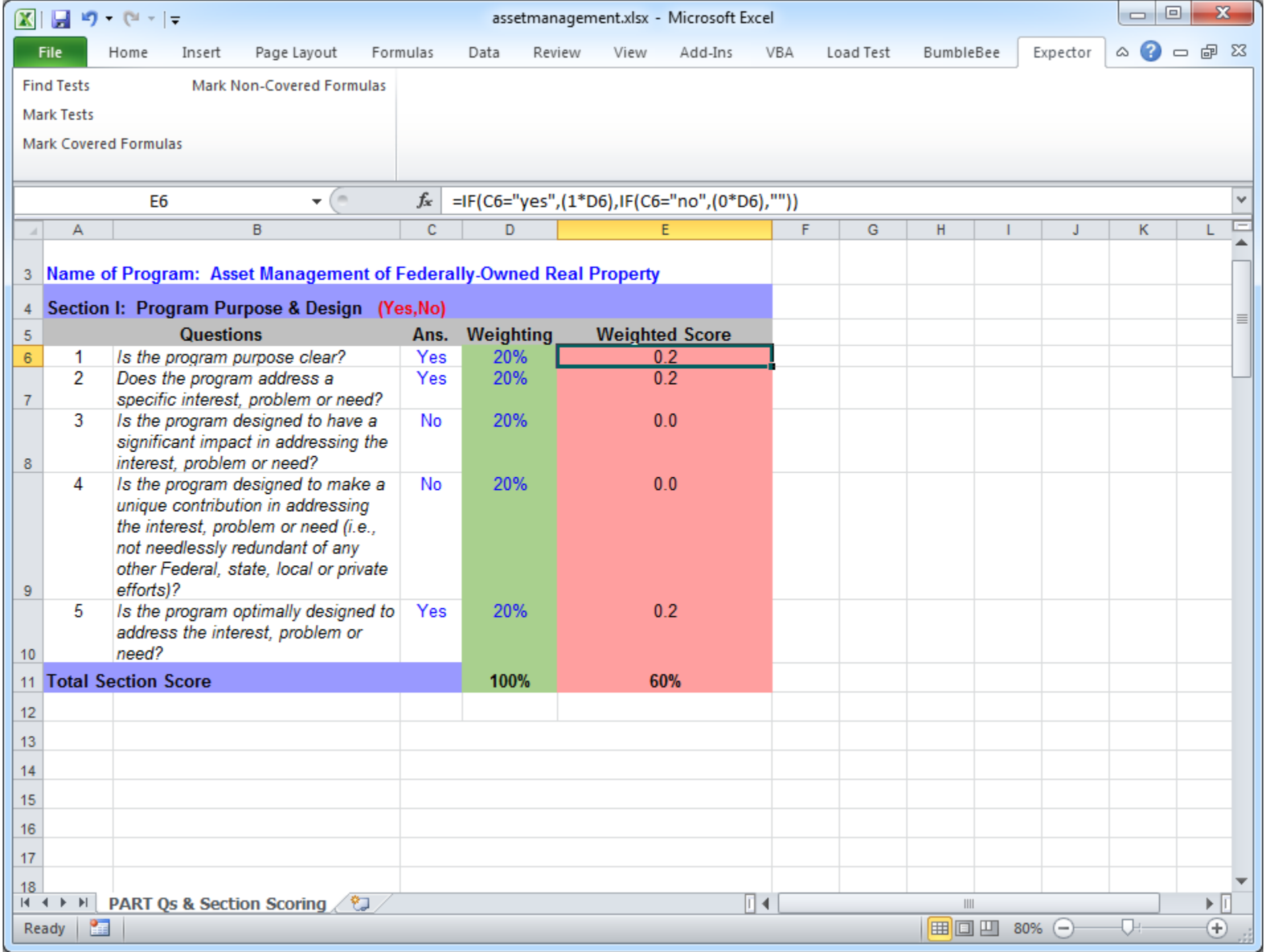
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Mark Non-Covered Formulas
E6
=IF(C6="yes",(1*D6),IF(C6="no",(0*D6),""))
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Total Section Score 100% 60%
PART Qs & Section Scoring
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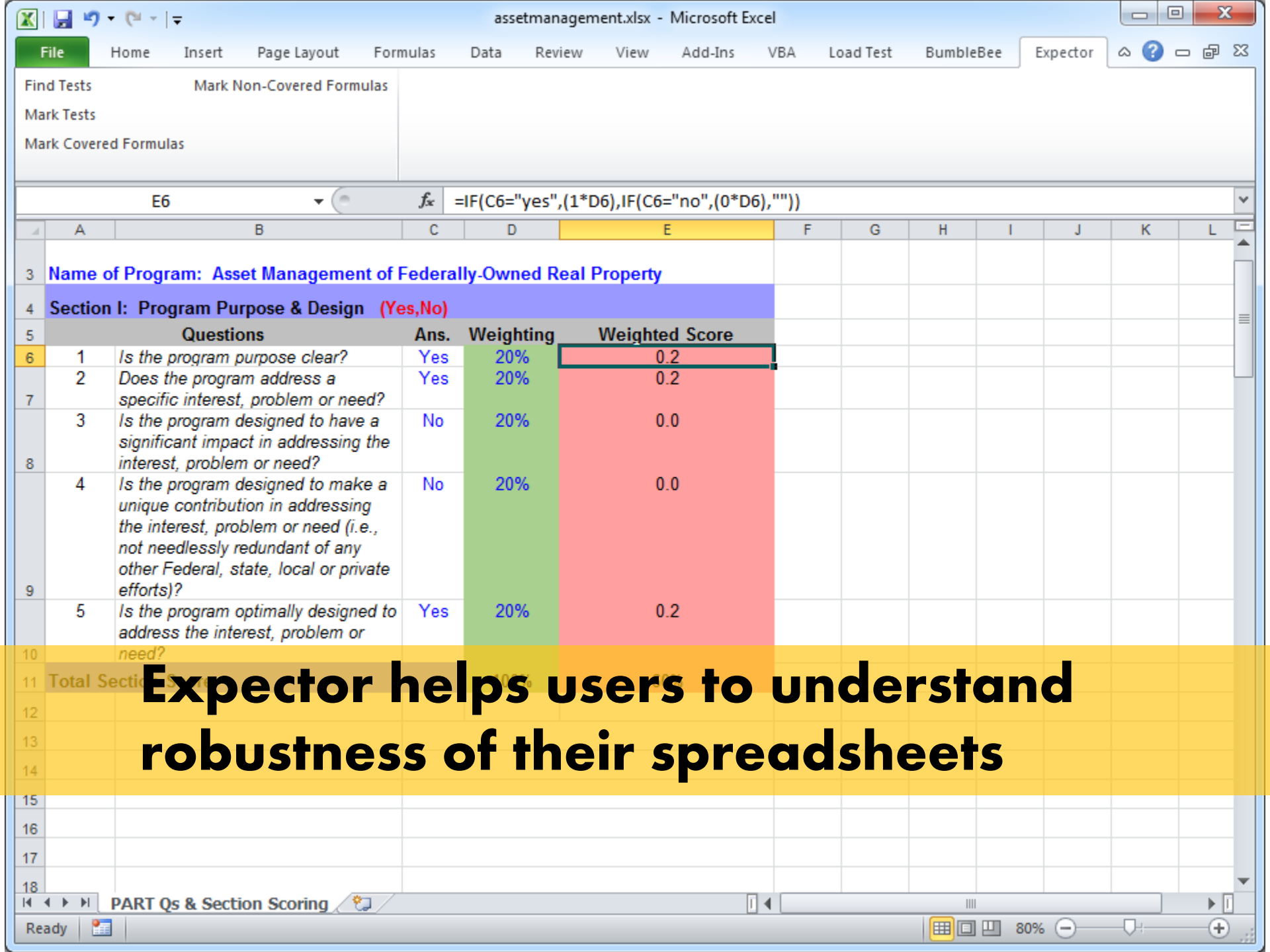
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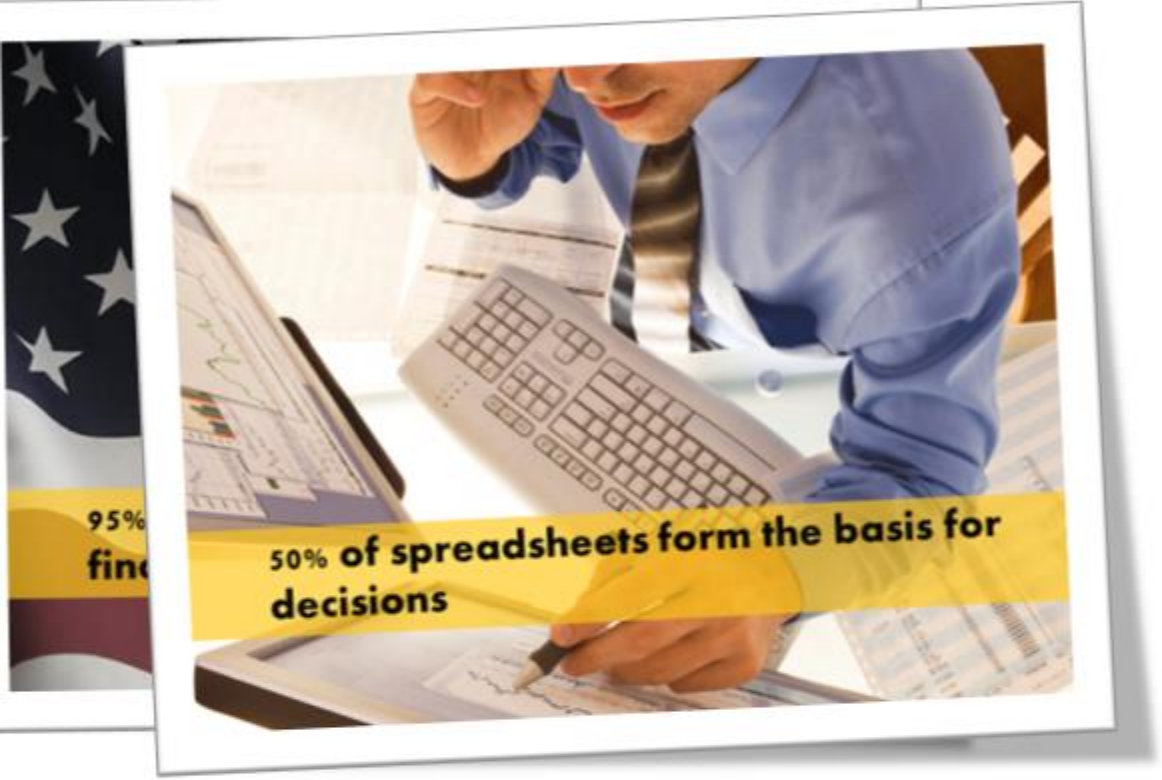
Expector helps users to understand robustness of their spreadsheets
PART Qs & Section Scoring
Ready
80%


By applying SE methods, we try to
prevent bridging problems in the future


95% of all U.S. firms use spreadsheets for financial reporting


95%
50% of spreadsheets form the basis for decisions


95%
50%
So, they are important, but also complex!


95%
50%
So, they are im
VOLVO XC90
OWNER'S MANUAL
Only 33% of spreadsheets has
a manual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50%
So, they are im
Only 33%
a manual
ERROR
Complex spreadsheets without
documentation can lead to serious erro

95%
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So, they are im

Only 33%
a manual

ERROR

Complex spreadsheets without
documentation can lead to serious erro

We found that problems occur when
spreadsheets are transferred


95%
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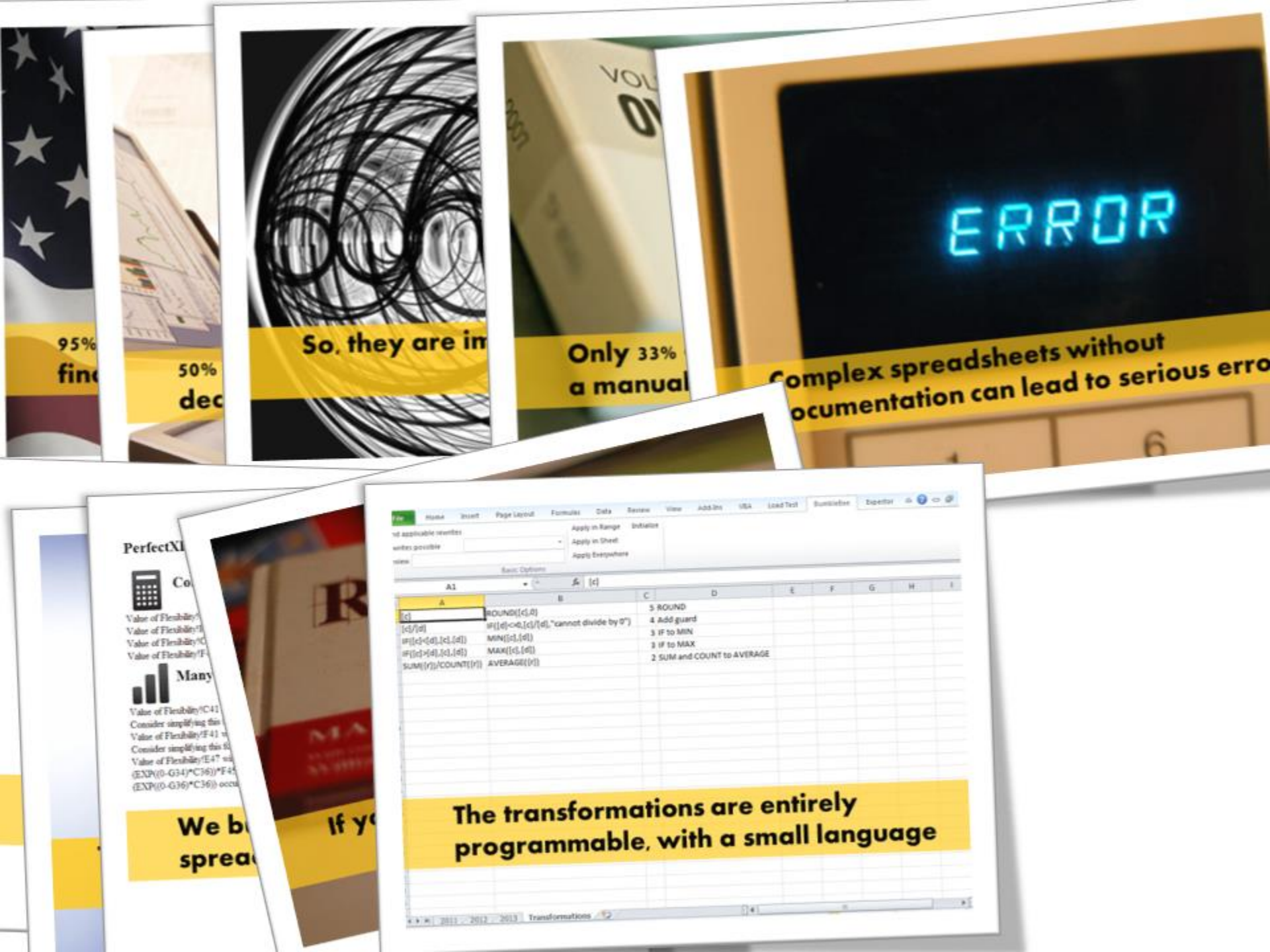
So, they are im
Only 33%
a manual
ERROR
Complex spreadsheets without
documentation can lead to serious erro
This led us to the idea of *formula* smells


95%
50%
So, they are im
Only 33%
a manual
ERROR
Complex spreadsheets without
documentation can lead to serious erro
PerfectXL analysis plan for Spreadsheet_5.xlsx
Containing fixed numbers
Value of Flexibility!C41 with formula (LN(C34/C35)+((G34-G36+(G35^2))*C36)/(((G35)*(0.5))*(C36*0.5))
Value of Flexibility!F41 with formula (LN(C34/C38)+((G34-G36+(G35^2))*C36)/(((G35)*(0.5))*(C36*0.5))
Value of Flexibility!C44 with formula C41-((G35*0.5)*(C36*(0.5)))
Value of Flexibility!F44 with formula F41-((G35*0.5)*(C36*(0.5)))
Many different operations
Value of Flexibility!C41 with formula (LN(C34/C35)+((G34-G36+(G35^2))*C36)/(((G35)*(0.5))*(C36*0.5))
Consider simplifying this formula
Value of Flexibility!F41 with formula (LN(C34/C38)+((G34-G36+(G35^2))*C36)/(((G35)*(0.5))*(C36*0.5))
Consider simplifying this formula
Value of Flexibility!E47 with formula (((EXP((0-G36)*C36))*C34*C42-C35*(EXP((0-G34)*C36)))*C45)-(((EXP((0-G36)*C36))*C34*F42-C38
(EXP((0-G34)*C36)))*F45))*C37/G37
(EXP((0-G36)*C36)) occurs multiple times in this formula, consider placing it in a separate cell
We built a tool that finds smells in
spreadsheets


95%
50%
So, they are im
Only 33%
a manual
ERROR
Complex spreadsheets without
ocumentation can lead to serious erro
REFACTORING
IMPROVING THE DESIGN
OF EXISTING CODE
MARTIN FOWLER
If you say smells, you say refactorings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Complex spreadsheets without
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The transformations are entirely
programmable, with a small language
ROUND([c],0)
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MIN([c],[d])
MAX([c],[d])
AVERAGE([r])
5 ROUND
4 Add guard
3 IF to MIN
3 IF to MAX
2 SUM and COUNT to AVERAGE
Transformations


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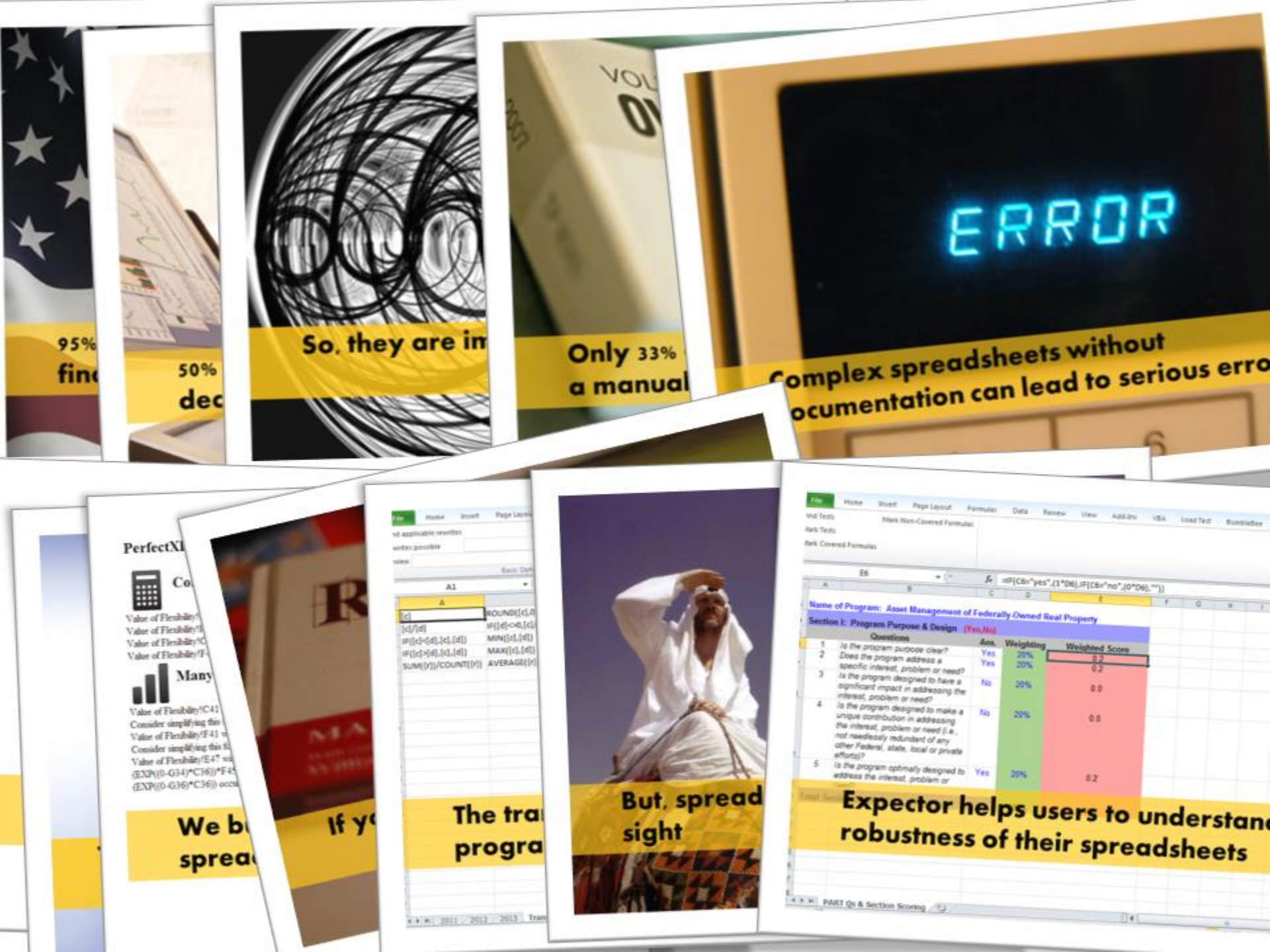
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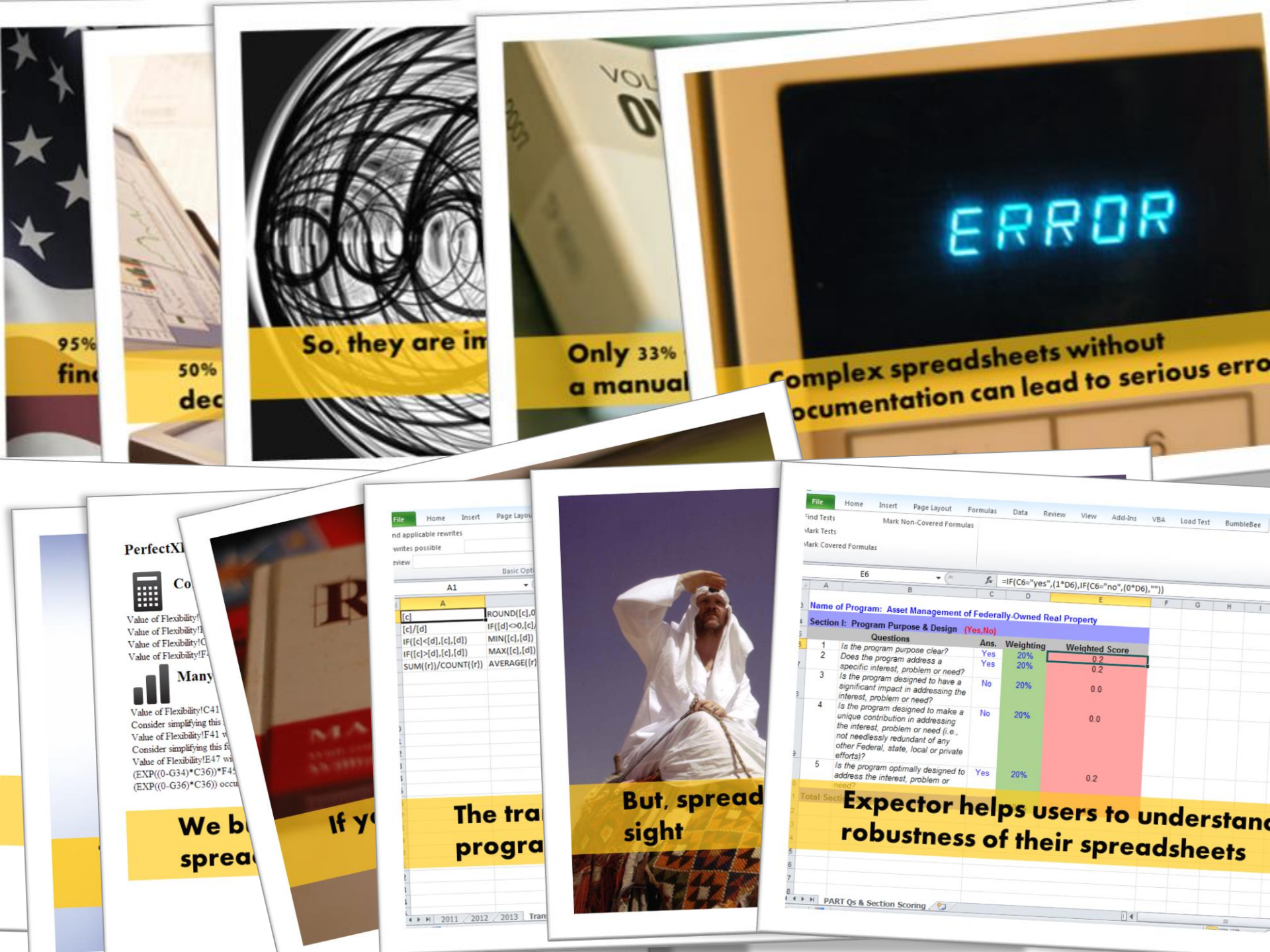
Expector helps users to understan
robustness of their spreadsheets

If you want to know more: @felienne

www.felienne.com felienne@gmail.com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