CMPU 101 § 53 · Computer Science I

Designing Programs for Tables

1 February 2024

We won't cover everything in class!

You need to follow along with the assigned readings.

- Practice active reading:
  - Keep Pyret open and try examples.
  - Take notes.

In lab and on assignments, you will be expected to try things that may only be in the readings – or may be new altogether.

- Lab and homework are additional opportunities for learning!

Data processing	*Feb. 6*	*Feb. 8*	*Feb. 9*
– Read 5.1 From tables to lists – Assignment 3: Sunrise, sunset	**Quiz 1**	Tables and lists	Lab 4: Squirrels!
Defining data	*Feb. 13*	*Feb. 15*	*Feb. 16*
– Read 6.1 Introduction to structured data – Read 7 Trees – Assignment 4: Decision trees	Data definitions	Trees	Lab 5: Call the plumber
Recursive programs	*Feb. 20*	*Feb. 22*	*Feb. 23*
	Review session	Generative recursion	**Exam 1**
Simulation and interaction	*Feb. 27*	*Feb. 29*	*Mar. 1*
– Read 26 Interactive games as reactive systems	Reactive programs	Graphs and simulation	Lab 6: 99 red balloons
Spring Break	*Mar. 5*	*Mar. 7*	*Mar. 8*
			


DON'T
PANIC

Think of the quiz as a check-in to see how well you understand the basics of what we've been doing before we get to Exam 1.

Tables and functional programming

We've seen we can

select certain rows using **`filter-with`** and

sort the rows a table with **`order-by`**,

but these functions don't change the original table!

Just as the expression **`2 + 3`** doesn't change the value of **`2`** or of **`3`**, functions that take a table as input don't change the original table.

Instead, they return a *new* table.

This is a paradigm called *functional programming*.

If you have experience working in other languages, this may seem strange, but it can be extremely useful!

We'll explore the idea of functional programming more over the coming weeks.

Loading tabular data


WNBA

Step 0: Get data


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1950—2000

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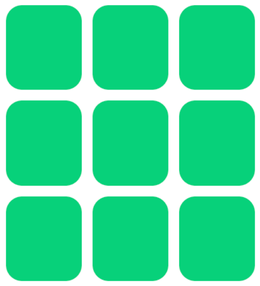
Every NBA & Every WNBA Player



Play Immaculate Grid

Put your men's basketball knowledge to the test with our daily men's basketball trivia game. Can you complete the grid?

Play Now

Recent Debuts

Chance Comanche (POR), Jacob Gilyard (MEM), RaiQuan Gray (BRK), Justin Minaya (POR), Donovan Williams (ATL) and Jeenathan Williams (POR)

NBA & ABA, WNBA, NBL, G League, and top International players

Includes indexed lists of players. International leagues include top European leagues and EuroLeague and EuroCup competitions, as well as China's CBA, Australia's NBL, and Men's Olympics.

Every NBA Team

2023-24 NBA Standings

Summary · Schedule · Scores · Leaders · Rookies

East			W	L
MIA	F	$	0	0
WAS	F	$	0	0
TOR	F	$	0	0
PHI	F	$	0	0
ORL	F	$	0	0
NYK	F	$	0	0
MIL	F	$	0	0
ATL	F	$	0	0
IND	F	$	0	0
CLE	F	$	0	0
BOS	F	$	0	0
BRK	F	$	0	0
CHI	F	$	0	0
CHO	F	$	0	0
DET	F	$	0	0

West			W	L
MEM	F	$	0	0
DEN	F	$	0	0
DAL	F	$	0	0
MIN	F	$	0	0
NOP	F	$	0	0
GSW	F	$	0	0
OKC	F	$	0	0
LAL	F	$	0	0
LAC	F	$	0	0
PHO	F	$	0	0
POR	F	$	0	0
SAC	F	$	0	0
SAS	F	$	0	0
UTA	F	$	0	0
HOU	F	$	0	0

Select Team Page:

Choose a team

... then a page

Go!

Team pages include statistics, rosters, payroll, schedules, game logs, splits, advanced stats, and more.

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WNBA Players: S. Bird · L. Leslie · A. Wilson · D. Taurasi · T. Catchings · B. Stewart

WNBA 2023: Summary · Standings · Schedule & Results · Playoffs · Leaders · Player Stats · Draft

WNBA 2022: Summary · Standings · Schedule & Results · Playoffs · Leaders · Player Stats · Draft

WNBA 2021: Summary · Standings · Schedule & Results · Playoffs · Leaders · Player Stats · Draft

WNBA 2020: Summary · Standings · Schedule & Results · Playoffs · Leaders · Player Stats · Draft

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Play Now

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NBA & ABA, WNBA, NBL, G League, and top International players

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WAS	F	$	0	0	DEN	F	$	0	0
TOR	F	$	0	0	DAL	F	$	0	0
PHI	F	$	0	0	MIN	F	$	0	0
ORL	F	$	0	0	NOP	F	$	0	0
NYK	F	$	0	0	GSW	F	$	0	0
MIL	F	$	0	0	OKC	F	$	0	0
ATL	F	$	0	0	LAL	F	$	0	0
IND	F	$	0	0	LAC	F	$	0	0
CLE	F	$	0	0	PHO	F	$	0	0
BOS	F	$	0	0	POR	F	$	0	0
BRK	F	$	0	0	SAC	F	$	0	0
CHI	F	$	0	0	SAS	F	$	0	0
CHO	F	$	0	0	UTA	F	$	0	0
DET	F	$	0	0	HOU	F	$	0	0

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www.basketball-reference.com/wnba/years/2023_per_game.html

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2023 WNBA Player Stats - Per Game

« Previous Season

PPG Leader: Jewell Loyd (24.7)
RPG Leader: Alyssa Thomas (9.9)
APG Leader: Courtney Vandersloot (8.1)
WS Leader: A'ja Wilson (10.4)

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WNBA ▾ | 2023 WNBA Season | Standings | Schedule and Results | Leaders | Coaches | Transactions | Player Stats ▲

Per Game | Totals | Per 36 Minutes | Per 100 Possessions | Advanced | Play-by-Play | Shooting

Player	Team	Pos	G	MP	G	GS	MP	FG	FGA	FG%	3P	3PA	3P%	2P	2PA	2P%	FT	FTA	FT%	ORB	TRB	AST	STL	BLK	TOV	PF	PTS
Lindsay Allen	MIN	G	29	698	29	20	24.1	2.2	5.6	.399	0.2	1.2	.206	2.0	4.4	.450	1.4	1.8	.792	0.6	2.4	4.5	0.6	0.1	1.3	2.1	6.2
Rebecca Allen	CON	G	40	858	40	27	21.5	2.5	6.0	.408	1.0	2.9	.348	1.5	3.1	.464	0.5	0.7	.704	0.7	2.8	0.9	0.9	1.3	0.9	1.9	6.4
Laeticia Amihere	ATL	F	20	147	20	0	7.4	0.9	2.1	.405	0.0	0.1	.000	0.9	2.1	.415	1.1	2.1	.537	0.3	1.0	0.2	0.3	0.5	0.6	1.1	2.8
Ariel Atkins	WAS	G	27	679	27	27	25.1	3.9	9.3	.414	1.6	4.6	.339	2.3	4.7	.488	2.3	2.5	.897	0.7	3.1	2.3	1.2	0.3	1.3	2.6	11.5
Shakira Austin	WAS	C-F	19	440	19	17	23.2	4.1	8.1	.500	0.0	0.0		4.1	8.1	.500	1.9	3.1	.610	1.5	7.0	0.9	0.8	0.9	1.8	2.3	10.0
Rachel Banham	MIN	G	32	435	32	1	13.6	1.9	5.2	.370	1.3	3.3	.402	0.6	1.8	.310	0.3	0.4	.786	0.1	1.0	1.7	0.3	0.1	1.1	1.4	5.5
Kierstan Bell	LVA	G	36	424	36	0	11.8	1.5	4.3	.346	0.6	2.3	.244	0.9	2.0	.465	0.2	0.3	.600	0.4	1.6	0.5	0.4	0.1	0.4	1.3	3.7
Grace Berger	IND	G	36	524	36	0	14.6	1.6	3.5	.449	0.4	0.9	.471	1.1	2.6	.441	0.6	0.7	.840	0.2	1.6	1.9	0.5	0.2	1.0	1.1	4.2
Morgan Bertsch	CHI	F	28	398	28	5	14.2	1.7	3.7	.456	0.6	1.3	.444	1.1	2.4	.463	0.4	0.6	.750	0.4	1.7	0.7	0.4	0.3	1.1	1.8	4.4
Monique Billings	ATL	F	39	653	39	9	16.7	1.7	4.3	.407	0.0	0.1	.000	1.7	4.2	.417	1.3	1.6	.836	1.4	5.0	0.8	0.4	0.3	0.9	1.9	4.8
DeWanna Bonner	CON	F-G	40	1203	40	40	30.1	5.8	13.7	.425	1.9	5.7	.329	4.0	8.0	.494	3.9	4.5	.862	0.9	5.6	2.2	1.1	0.6	1.5	1.6	17.4
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	5.8	10.1	.578	0.1	0.3	.400	5.7	9.8	.583	2.7	3.6	.745	3.1	8.4	2.2	1.3	1.3	1.9	3.1	14.5

https://www.basketball-reference.com/wnba/years/2023_totals.html

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via Sports Logos.net
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Totals

*-Hall of Famer; **Bold**=Active Player | Share & Export ▾ | Glossary | Hide Partial Rows

Player	Team	Pos	G	MP	G	GS	MP	FG	FGA	FG%	3P	3PA	3P%	2P	2PA	2P%	FT	FTA	FT%	ORB	TRB	AST	STL	BLK	TOV	PF	PTS
Lindsay Allen	MIN	G	29	698	29	20	698	65	163	.399	7	34	.206	58	129	.450	42	53	.792	17	71	130	17	3	37	61	179
Rebecca Allen	CON	G	40	858	40	27	858	98	240	.408	40	115	.348	58	125	.464	19	27	.704	28	113	37	37	50	34	77	255
Laeticia Amihere	ATL	F	20	147	20	0	147	17	42	.405	0	1	.000	17	41	.415	22	41	.537	5	20	4	5	9	11	21	56
Ariel Atkins	WAS	G	27	679	27	27	679	104	251	.414	42	124	.339	62	127	.488	61	68	.897	18	83	61	32	9	35	71	311
Shakira Austin	WAS	C-F	19	440	19	17	440	77	154	.500	0	0		77	154	.500	36	59	.610	29	133	17	16	17	35	44	190
Rachel Banham	MIN	G	32	435	32	1	435	61	165	.370	43	107	.402	18	58	.310	11	14	.786	4	32	54	11	3	36	45	176
Kierstan Bell	LVA	G	36	424	36	0	424	53	153	.346	20	82	.244	33	71	.465	6	10	.600	14	56	18	15	5	14	47	132
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Monique Billings	ATL	F	39	653	39	9	653	68	167	.407	0	4	.000	68	163	.417	51	61	.836	53	194	30	16	12	37	76	187
DeWanna Bonner	CON	F-G	40	1203	40	40	1203	233	548	.425	75	228	.329	158	320	.494	156	181	.862	35	224	87	42	25	58	64	697
Aliyah Boston	IND	F-C	40	1249	40	40	1249	233	403	.578	4	10	.400	229	393	.583	108	145	.745	125	335	89	53	50	75	125	578

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Morgan Bertsch	CHI	F	28	398	28	5	398	47	103	.456	16	36	.444	31	67	.463	12	16	.750	12	47	19	10	7	30	50	122
Monique Billings	ATL	F	39	653	39	9	653	68	167	.407	0	4	.000	68	163	.417	51	61	.836	53	194	30	16	12	37	76	187
DeWanna Bonner	CON	F-G	40	1203	40	40	1203	233	548	.425	75	228	.329	158	320	.494	156	181	.862	35	224	87	42	25	58	64	697
Aliyah Boston	IND	F-C	40	1249	40	40	1249	233	403	.578	4	10	.400	229	393	.583	108	145	.745	125	335	89	53	50	75	125	578

www.basketball-reference.com/wnba/years/2023_totals.html

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Basic Stats | Per Game Stats | Per 36 Min. Stats | Per 100 Poss | Advanced Stats | Play-by-Play | Shooting

Totals

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Video: SR Sharing Tools & How-to
Video: Stats Table Tips & Tricks
Data Usage Terms

Player	Team	Pos	G	M												%	FT	FTA	FT%	ORB	TRB	AST	STL	BLK	TOV	PF	PTS
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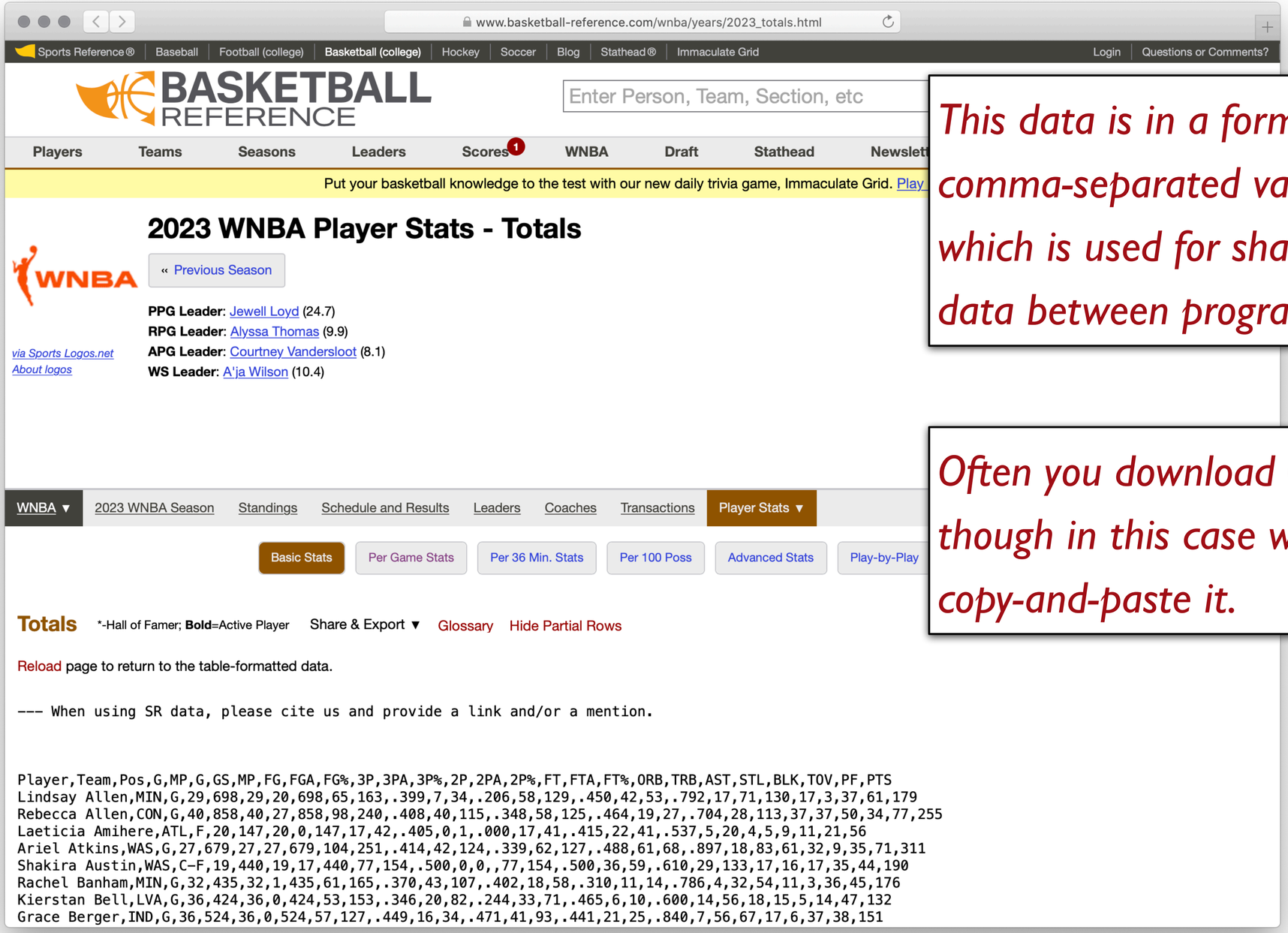
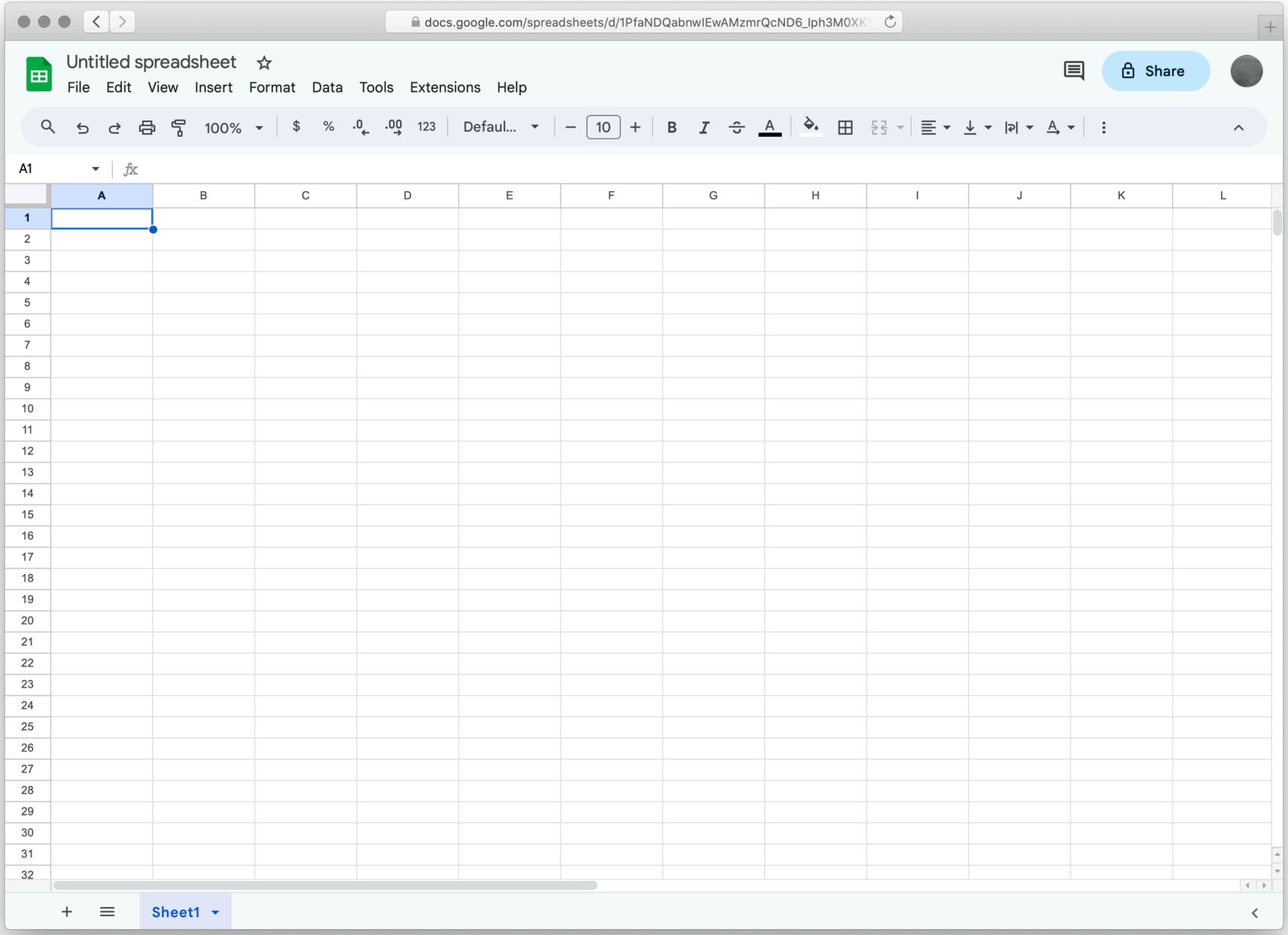


This data is in a format called comma-separated values (CSV) which is used for sharing tabular data between programs.

Often you download CSV files, though in this case we can just copy-and-paste it.

Step 0: Get data

Step 1: Make a spreadsheet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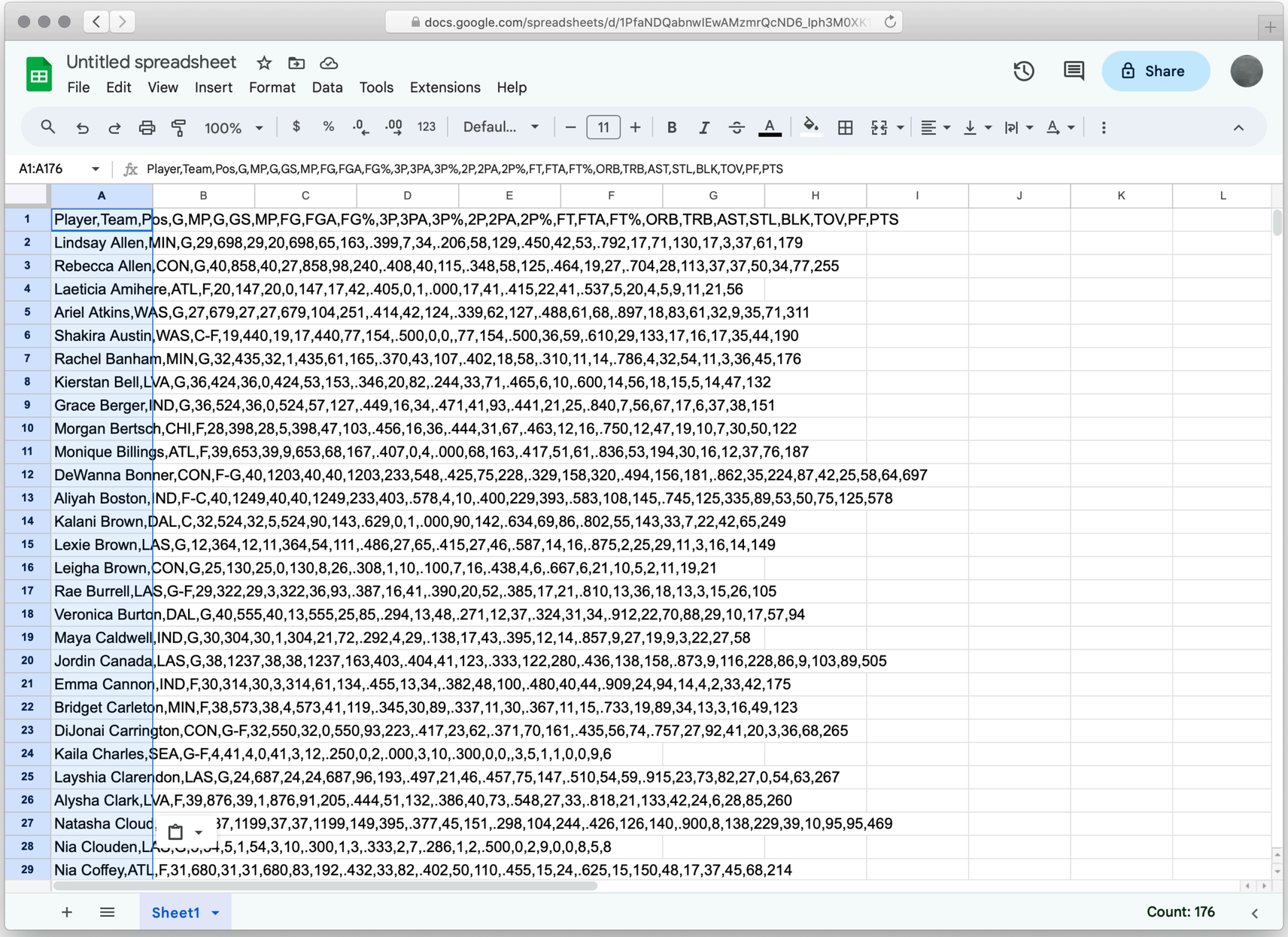
Sheet1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Share
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Player,Team,Pos,G,MP,G,GS,MP,FG,FGA,FG%,3P,3PA,3P%,2P,2PA,2P%,FT,FTA,FT%,ORB,TRB,AST,STL,BLK,TOV,PF,PTS
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Grace Berger,IND,G,36,524,36,0,524,57,127,.449,16,34,.471,41,93,.441,21,25,.840,7,56,67,17,6,37,38,151
Morgan Bertsch,CHI,F,28,398,28,5,398,47,103,.456,16,36,.444,31,67,.463,12,16,.750,12,47,19,10,7,30,50,122
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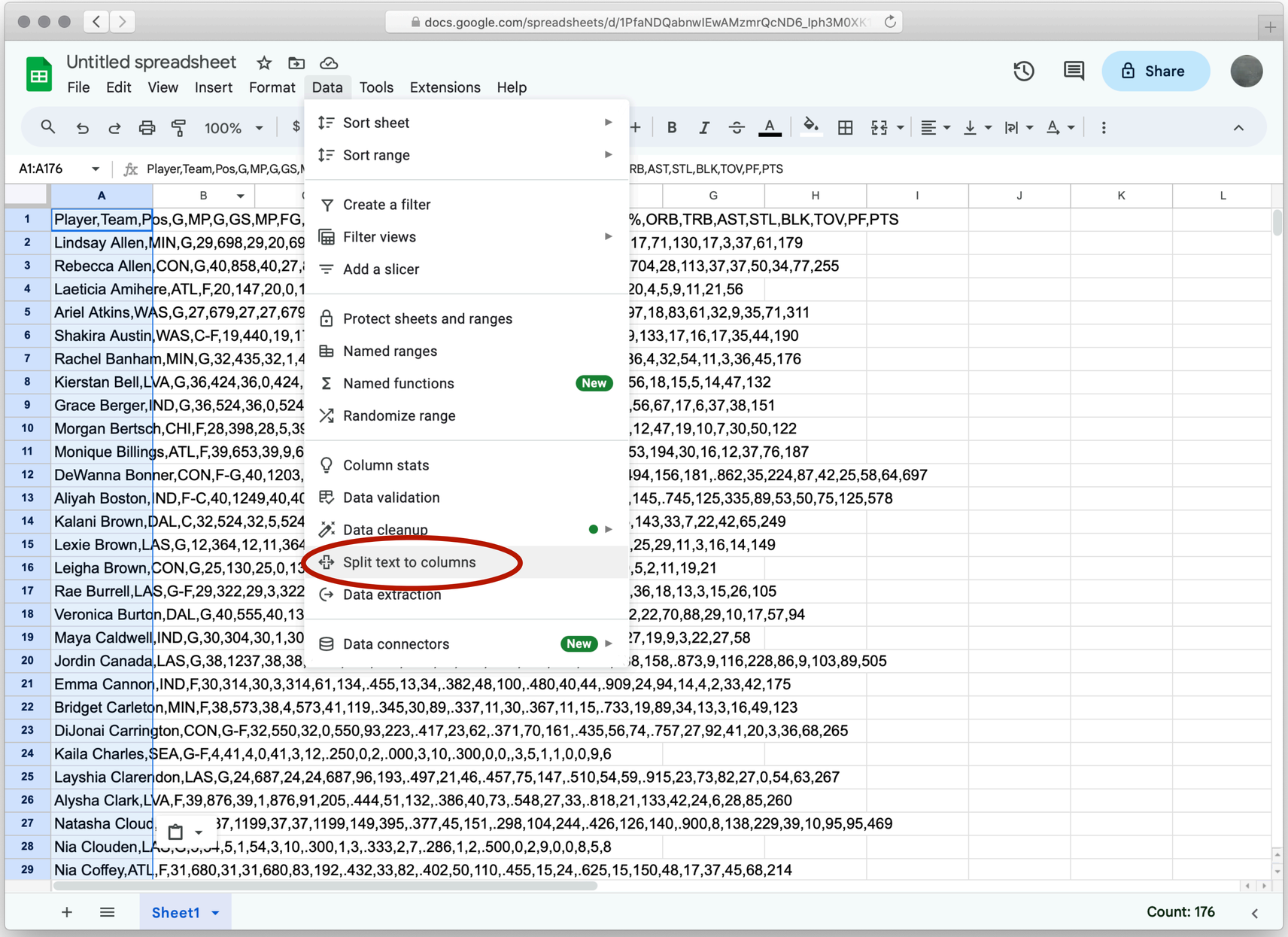
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Share
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Sort range
Create a filter
Filter views
Add a slicer
Protect sheets and ranges
Named ranges
Named functions
New
Randomize range
Column stats
Data validation
Data cleanup
Split text to columns
Data extraction
Data connectors
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DeWanna Bonner,CON,F-G,40,1203,
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Aliyah Boston,IND,F-C,40,1249,40,40
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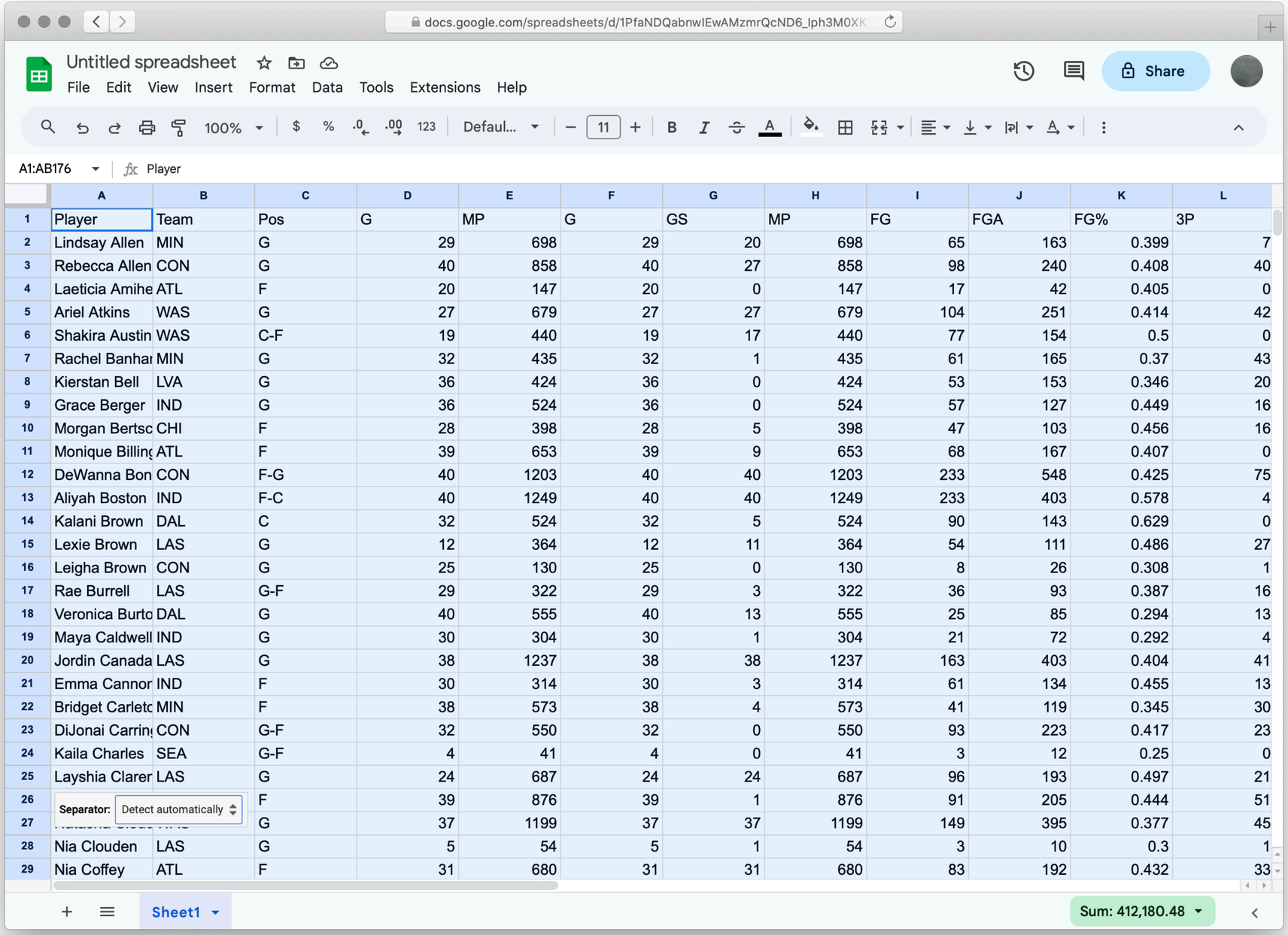
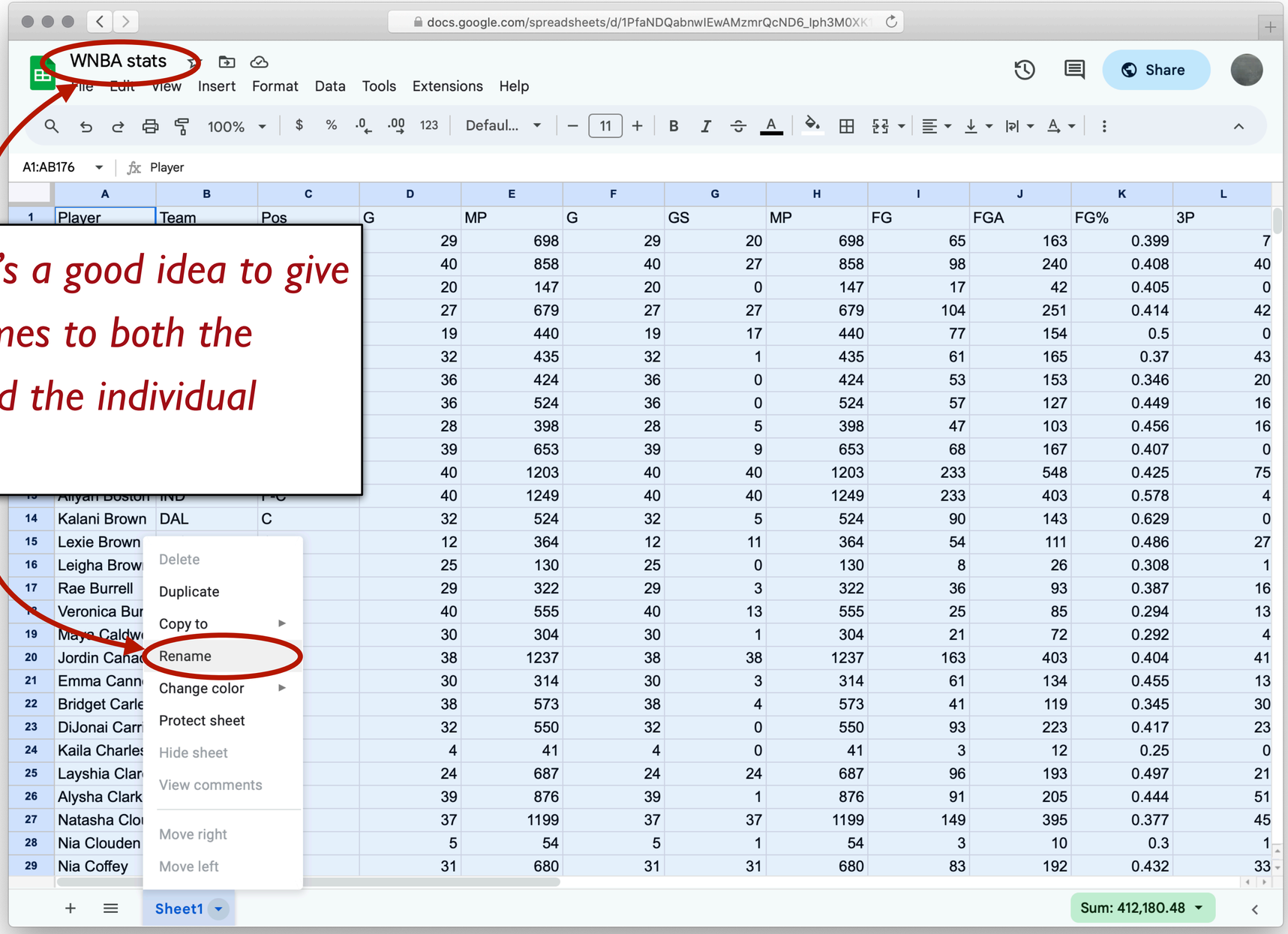
Sheet1
Count: 176



	A	B	C	D	E	F	G	H	I	J	K	L
1	Player	Team	Pos	G	MP	G	GS	MP	FG	FGA	FG%	3P
2	Lindsay Allen	MIN	G	29	698	29	20	698	65	163	0.399	7
3	Rebecca Allen	CON	G	40	858	40	27	858	98	240	0.408	40
4	Laeticia Amihe	ATL	F	20	147	20	0	147	17	42	0.405	0
5	Ariel Atkins	WAS	G	27	679	27	27	679	104	251	0.414	42
6	Shakira Austin	WAS	C-F	19	440	19	17	440	77	154	0.5	0
7	Rachel Banhar	MIN	G	32	435	32	1	435	61	165	0.37	43
8	Kierstan Bell	LVA	G	36	424	36	0	424	53	153	0.346	20
9	Grace Berger	IND	G	36	524	36	0	524	57	127	0.449	16
10	Morgan Bertsc	CHI	F	28	398	28	5	398	47	103	0.456	16
11	Monique Billing	ATL	F	39	653	39	9	653	68	167	0.407	0
12	DeWanna Bon	CON	F-G	40	1203	40	40	1203	233	548	0.425	75
13	Aliyah Boston	IND	F-C	40	1249	40	40	1249	233	403	0.578	4
14	Kalani Brown	DAL	C	32	524	32	5	524	90	143	0.629	0
15	Lexie Brown	LAS	G	12	364	12	11	364	54	111	0.486	27
16	Leigha Brown	CON	G	25	130	25	0	130	8	26	0.308	1
17	Rae Burrell	LAS	G-F	29	322	29	3	322	36	93	0.387	16
18	Veronica Burto	DAL	G	40	555	40	13	555	25	85	0.294	13
19	Maya Caldwell	IND	G	30	304	30	1	304	21	72	0.292	4
20	Jordin Canada	LAS	G	38	1237	38	38	1237	163	403	0.404	41
21	Emma Cannor	IND	F	30	314	30	3	314	61	134	0.455	13
22	Bridget Carleto	MIN	F	38	573	38	4	573	41	119	0.345	30
23	DiJonai Carrin	CON	G-F	32	550	32	0	550	93	223	0.417	23
24	Kaila Charles	SEA	G-F	4	41	4	0	41	3	12	0.25	0
25	Layshia Clarer	LAS	G	24	687	24	24	687	96	193	0.497	21
26			F	39	876	39	1	876	91	205	0.444	51
27			G	37	1199	37	37	1199	149	395	0.377	45
28	Nia Clouden	LAS	G	5	54	5	1	54	3	10	0.3	1
29	Nia Coffey	ATL	F	31	680	31	31	680	83	192	0.432	33

At this point, it's a good idea to give meaningful names to both the spreadsheet and the individual sheet.

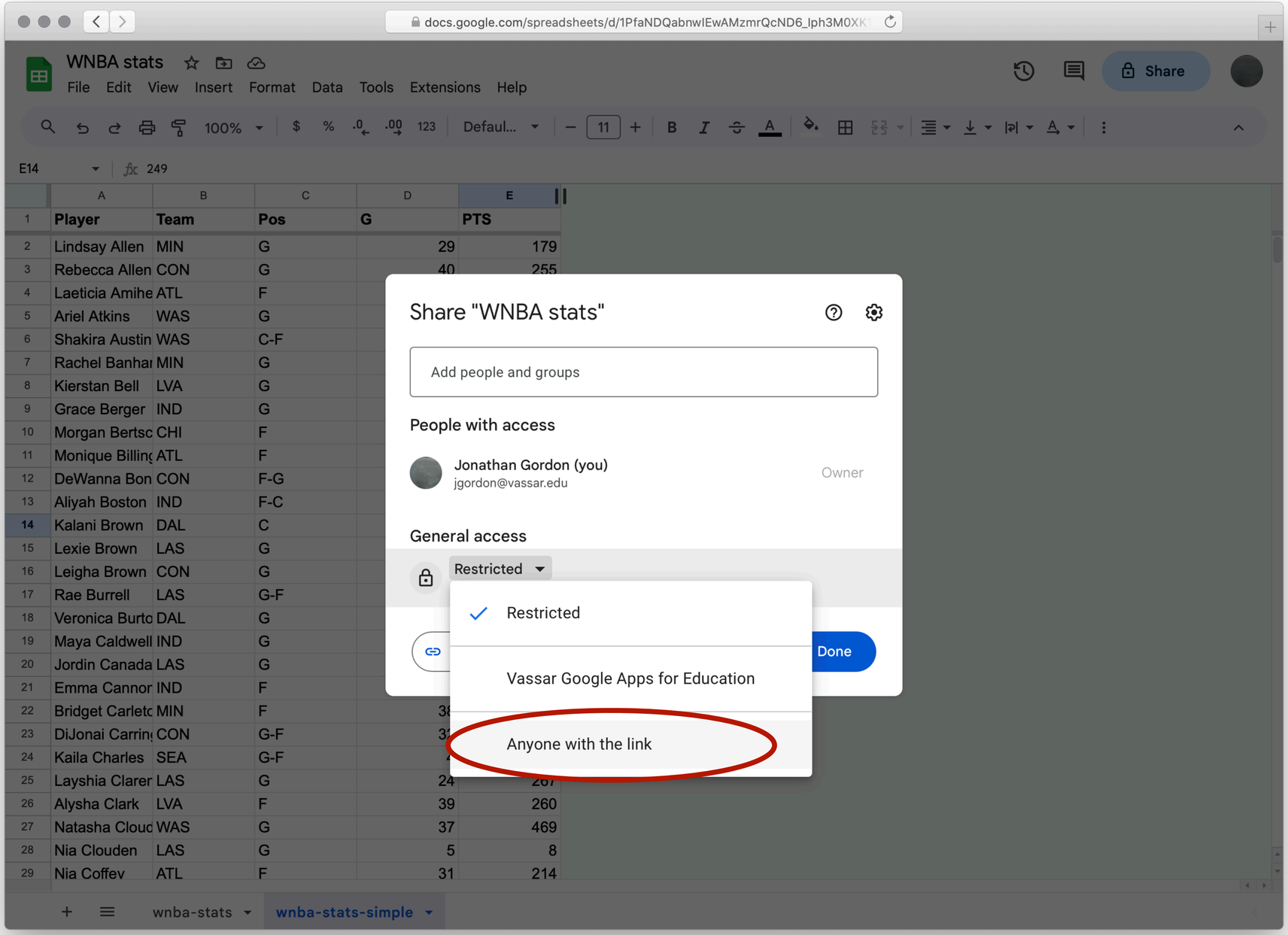


	A	B	C	D	E	F	G	H	I	J	K	L
1	Player	Team	Pos	G	MP	G	GS	MP	FG	FGA	FG%	3P
2				29	698	29	20	698	65	163	0.399	7
3				40	858	40	27	858	98	240	0.408	40
4				20	147	20	0	147	17	42	0.405	0
5				27	679	27	27	679	104	251	0.414	42
6				19	440	19	17	440	77	154	0.5	0
7				32	435	32	1	435	61	165	0.37	43
8				36	424	36	0	424	53	153	0.346	20
9				36	524	36	0	524	57	127	0.449	16
10				28	398	28	5	398	47	103	0.456	16
11				39	653	39	9	653	68	167	0.407	0
12				40	1203	40	40	1203	233	548	0.425	75
13	Aliyah Boston	IND	F-C	40	1249	40	40	1249	233	403	0.578	4
14	Kalani Brown	DAL	C	32	524	32	5	524	90	143	0.629	0
15	Lexie Brown			12	364	12	11	364	54	111	0.486	27
16	Leigha Brow			25	130	25	0	130	8	26	0.308	1
17	Rae Burrell			29	322	29	3	322	36	93	0.387	16
18	Veronica Bur			40	555	40	13	555	25	85	0.294	13
19	Maya Caldw			30	304	30	1	304	21	72	0.292	4
20	Jordin Canad			38	1237	38	38	1237	163	403	0.404	41
21	Emma Cann			30	314	30	3	314	61	134	0.455	13
22	Bridget Carle			38	573	38	4	573	41	119	0.345	30
23	DiJonai Carr			32	550	32	0	550	93	223	0.417	23
24	Kaila Charles			4	41	4	0	41	3	12	0.25	0
25	Layshia Clar			24	687	24	24	687	96	193	0.497	21
26	Alysha Clark			39	876	39	1	876	91	205	0.444	51
27	Natasha Clo			37	1199	37	37	1199	149	395	0.377	45
28	Nia Clouden			5	54	5	1	54	3	10	0.3	1
29	Nia Coffey			31	680	31	31	680	83	192	0.432	33

Step 0: Get data

Step 1: Make a spreadsheet

Step 2: Load the spreadsheet as a table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WNBA stats
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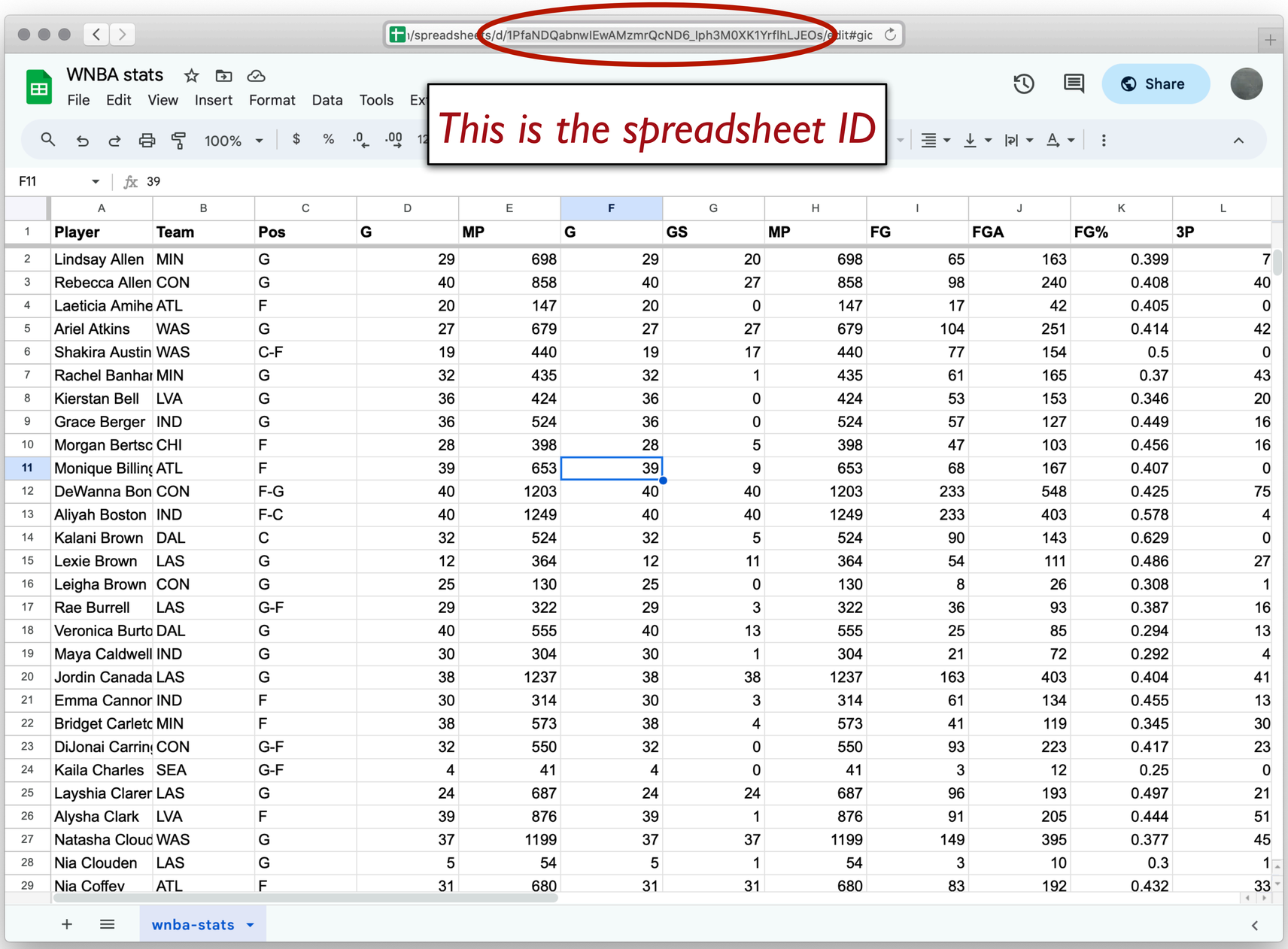
Share
E14
249
Player Team Pos G PTS
Lindsay Allen MIN G 29 179
Rebecca Allen CON G 40 255
Laeticia Amihe ATL F
Ariel Atkins WAS G
Shakira Austin WAS C-F
Rachel Banhar MIN G
Kierstan Bell LVA G
Grace Berger IND G
Morgan Bertsc CHI F
Monique Billing ATL F
DeWanna Bon CON F-G
Aliyah Boston IND F-C
Kalani Brown DAL C
Lexie Brown LAS G
Leigha Brown CON G
Rae Burrell LAS G-F
Veronica Burto DAL G
Maya Caldwell IND G
Jordin Canada LAS G
Emma Cannor IND F
Bridget Carleto MIN F
DiJonai Carrin CON G-F
Kaila Charles SEA G-F
Layshia Clarer LAS G 24
Alysha Clark LVA F 39 260
Natasha Cloud WAS G 37 469
Nia Clouden LAS G 5 8
Nia Coffey ATL F 31 214
Share "WNBA stats"
Add people and groups
People with access
Jonathan Gordon (you)
jgordon@vassar.edu
Owner
General access
Restricted
Restricted
Vassar Google Apps for Education
Anyone with the link
Done
wnba-stats
wnba-stats-simple



	A	B	C	D	E	F	G	H	I	J	K	L
1	**Player**	**Team**	**Pos**	**G**	**MP**	**G**	**GS**	**MP**	**FG**	**FGA**	**FG%**	**3P**
2	Lindsay Allen	MIN	G	29	698	29	20	698	65	163	0.399	7
3	Rebecca Allen	CON	G	40	858	40	27	858	98	240	0.408	40
4	Laeticia Amihe	ATL	F	20	147	20	0	147	17	42	0.405	0
5	Ariel Atkins	WAS	G	27	679	27	27	679	104	251	0.414	42
6	Shakira Austin	WAS	C-F	19	440	19	17	440	77	154	0.5	0
7	Rachel Banhar	MIN	G	32	435	32	1	435	61	165	0.37	43
8	Kierstan Bell	LVA	G	36	424	36	0	424	53	153	0.346	20
9	Grace Berger	IND	G	36	524	36	0	524	57	127	0.449	16
10	Morgan Bertsc	CHI	F	28	398	28	5	398	47	103	0.456	16
11	Monique Billing	ATL	F	39	653	39	9	653	68	167	0.407	0
12	DeWanna Bon	CON	F-G	40	1203	40	40	1203	233	548	0.425	75
13	Aliyah Boston	IND	F-C	40	1249	40	40	1249	233	403	0.578	4
14	Kalani Brown	DAL	C	32	524	32	5	524	90	143	0.629	0
15	Lexie Brown	LAS	G	12	364	12	11	364	54	111	0.486	27
16	Leigha Brown	CON	G	25	130	25	0	130	8	26	0.308	1
17	Rae Burrell	LAS	G-F	29	322	29	3	322	36	93	0.387	16
18	Veronica Burto	DAL	G	40	555	40	13	555	25	85	0.294	13
19	Maya Caldwell	IND	G	30	304	30	1	304	21	72	0.292	4
20	Jordin Canada	LAS	G	38	1237	38	38	1237	163	403	0.404	41
21	Emma Cannor	IND	F	30	314	30	3	314	61	134	0.455	13
22	Bridget Carleto	MIN	F	38	573	38	4	573	41	119	0.345	30
23	DiJonai Carrin	CON	G-F	32	550	32	0	550	93	223	0.417	23
24	Kaila Charles	SEA	G-F	4	41	4	0	41	3	12	0.25	0
25	Layshia Clarer	LAS	G	24	687	24	24	687	96	193	0.497	21
26	Alysha Clark	LVA	F	39	876	39	1	876	91	205	0.444	51
27	Natasha Cloud	WAS	G	37	1199	37	37	1199	149	395	0.377	45
28	Nia Clouden	LAS	G	5	54	5	1	54	3	10	0.3	1
29	Nia Coffey	ATL	F	31	680	31	31	680	83	192	0.432	33

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include gdrive-sheets

include shared-gdrive("dcic-2021",
  "1wyQZj_L0qqV9Ekgr9au6RX2iqt2Ga8Ep")


# Load spreadsheet as a table

ssid = "1PfaNDQabnwIEwAMzmrQcND6_Iph3M0XK1YrflhLJEOs"
spreadsheet = load-spreadsheet(ssid)
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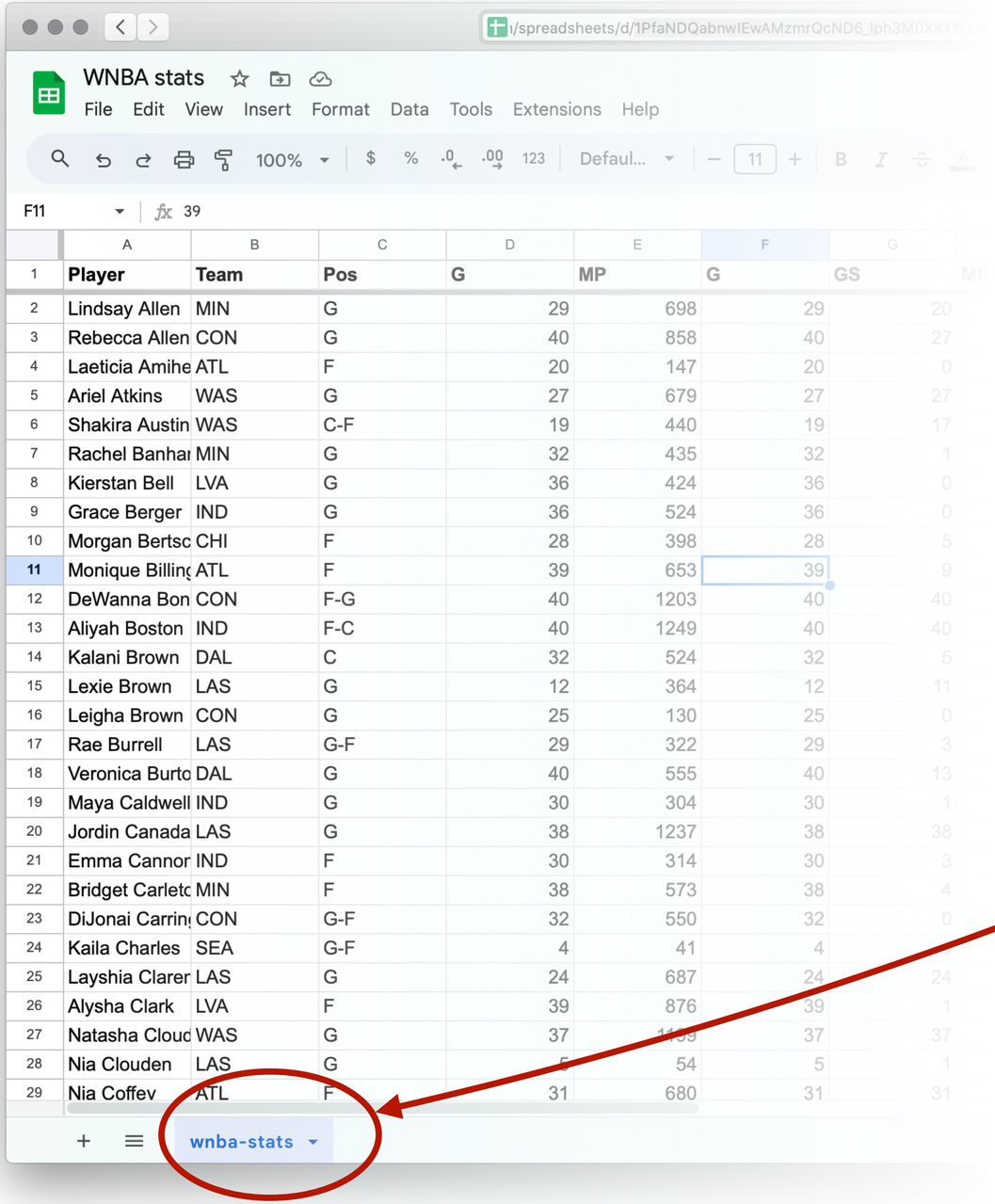


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>>> spreadsheet
spreadsheet("wnba-stats")
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include gdrive-sheets

include shared-gdrive("dcic-2021",
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# Load spreadsheet as a table

ssid = "1PfaNDQabnwIEwAMzmrQcND6_Iph3M0XK1YrflhLJEOs"
spreadsheet = load-spreadsheet(ssid)

stats =
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    ...
    source: spreadsheet.sheet-by-name("wnba-stats",
        true)
  end
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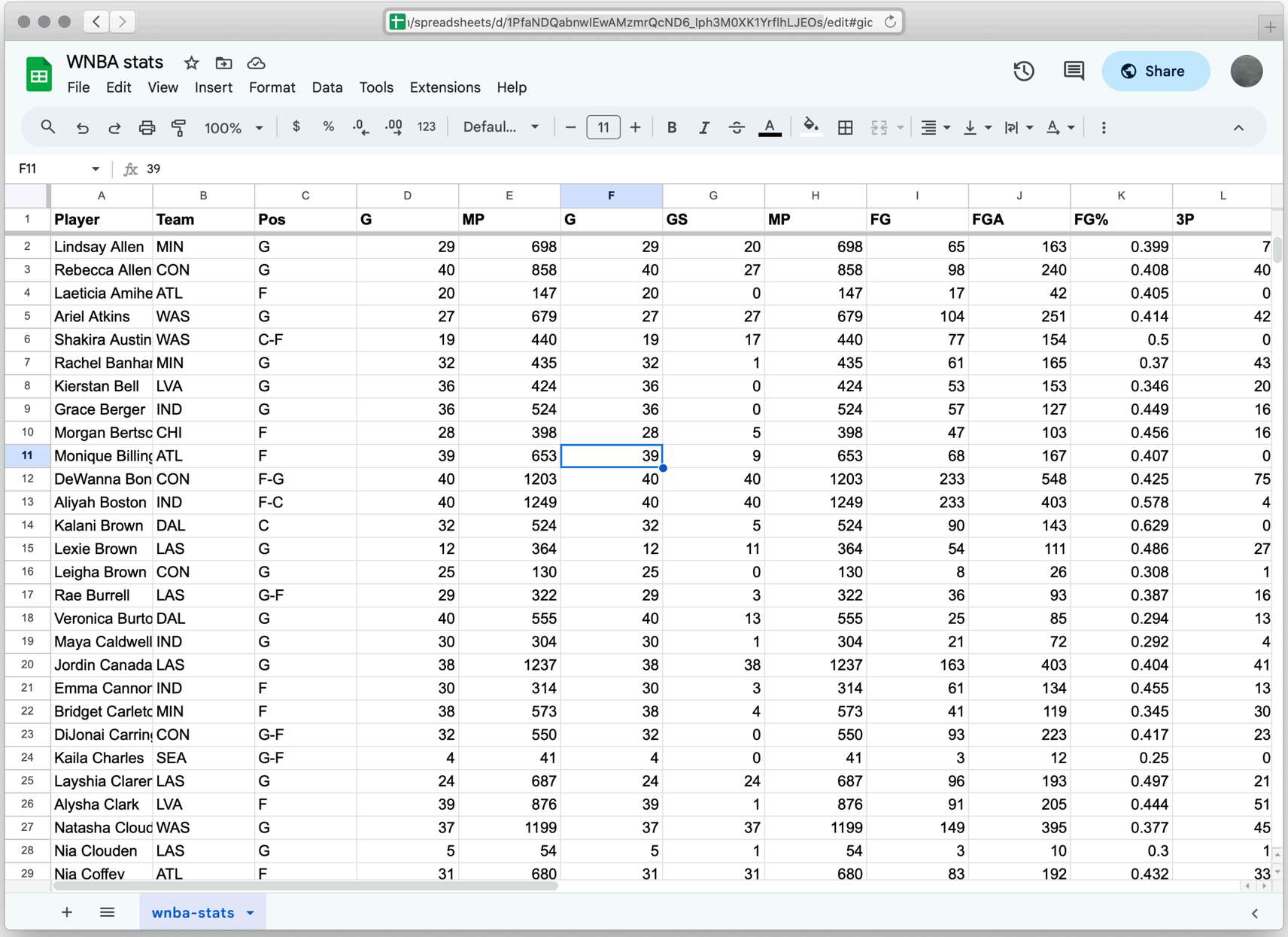
This means we should skip the first row of the spreadsheet, which consists of column names.



	A	B	C	D	E	F	G	H	I	J	K	L
1	**Player**	**Team**	**Pos**	**G**	**MP**	**G**	**GS**	**MP**	**FG**	**FGA**	**FG%**	**3P**
2	Lindsay Allen	MIN	G	29	698	29	20	698	65	163	0.399	7
3	Rebecca Allen	CON	G	40	858	40	27	858	98	240	0.408	40
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5	Ariel Atkins	WAS	G	27	679	27	27	679	104	251	0.414	42
6	Shakira Austin	WAS	C-F	19	440	19	17	440	77	154	0.5	0
7	Rachel Banhar	MIN	G	32	435	32	1	435	61	165	0.37	43
8	Kierstan Bell	LVA	G	36	424	36	0	424	53	153	0.346	20
9	Grace Berger	IND	G	36	524	36	0	524	57	127	0.449	16
10	Morgan Bertsc	CHI	F	28	398	28	5	398	47	103	0.456	16
11	Monique Billing	ATL	F	39	653	39	9	653	68	167	0.407	0
12	DeWanna Bon	CON	F-G	40	1203	40	40	1203	233	548	0.425	75
13	Aliyah Boston	IND	F-C	40	1249	40	40	1249	233	403	0.578	4
14	Kalani Brown	DAL	C	32	524	32	5	524	90	143	0.629	0
15	Lexie Brown	LAS	G	12	364	12	11	364	54	111	0.486	27
16	Leigha Brown	CON	G	25	130	25	0	130	8	26	0.308	1
17	Rae Burrell	LAS	G-F	29	322	29	3	322	36	93	0.387	16
18	Veronica Burto	DAL	G	40	555	40	13	555	25	85	0.294	13
19	Maya Caldwell	IND	G	30	304	30	1	304	21	72	0.292	4
20	Jordin Canada	LAS	G	38	1237	38	38	1237	163	403	0.404	41
21	Emma Cannor	IND	F	30	314	30	3	314	61	134	0.455	13
22	Bridget Carleto	MIN	F	38	573	38	4	573	41	119	0.345	30
23	DiJonai Carrin	CON	G-F	32	550	32	0	550	93	223	0.417	23
24	Kaila Charles	SEA	G-F	4	41	4	0	41	3	12	0.25	0
25	Layshia Clarer	LAS	G	24	687	24	24	687	96	193	0.497	21
26	Alysha Clark	LVA	F	39	876	39	1	876	91	205	0.444	51
27	Natasha Cloud	WAS	G	37	1199	37	37	1199	149	395	0.377	45
28	Nia Clouden	LAS	G	5	54	5	1	54	3	10	0.3	1
29	Nia Coffey	ATL	F	31	680	31	31	680	83	192	0.432	33

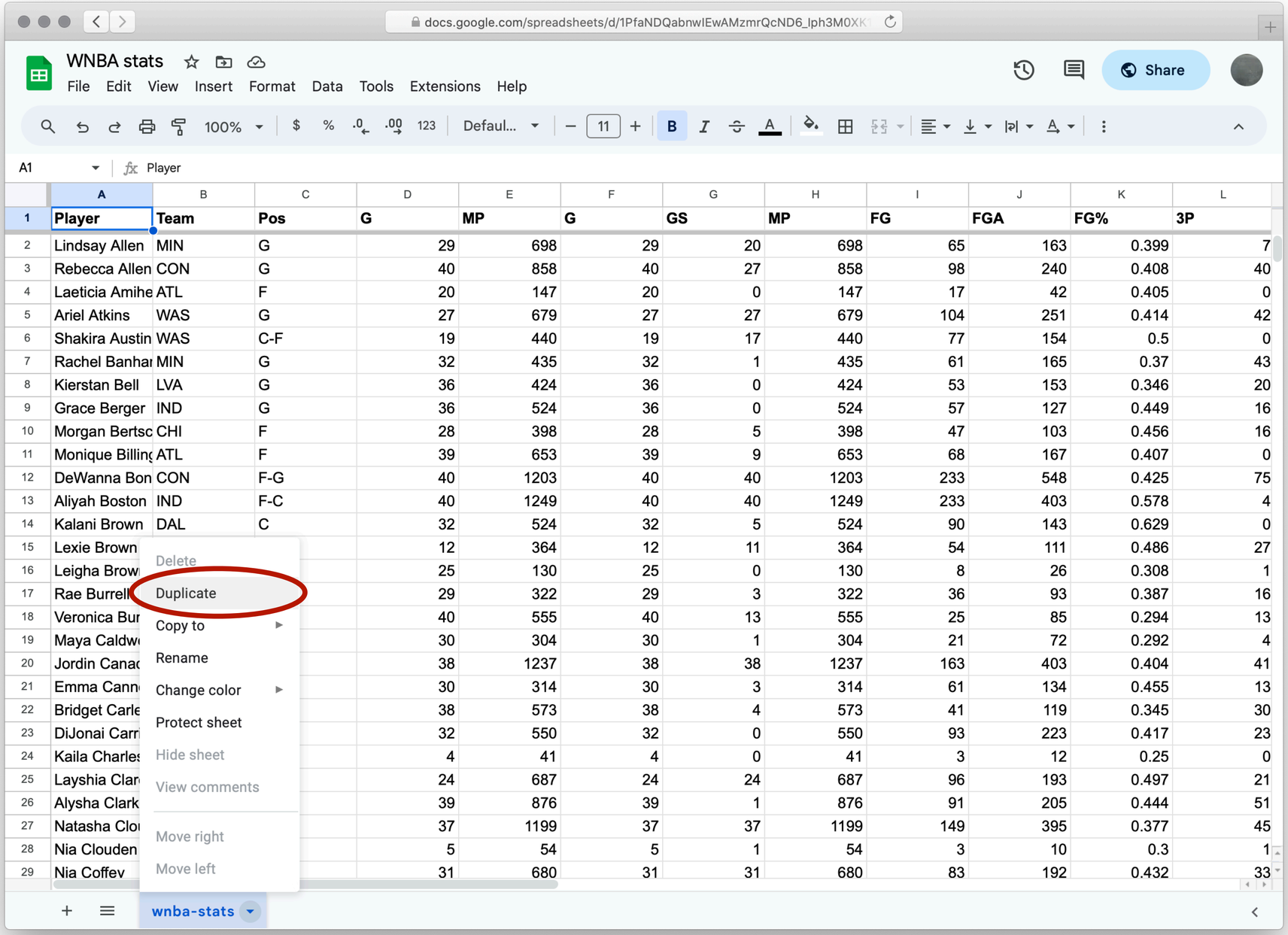
This is a lot of columns!

Step 0: Get data

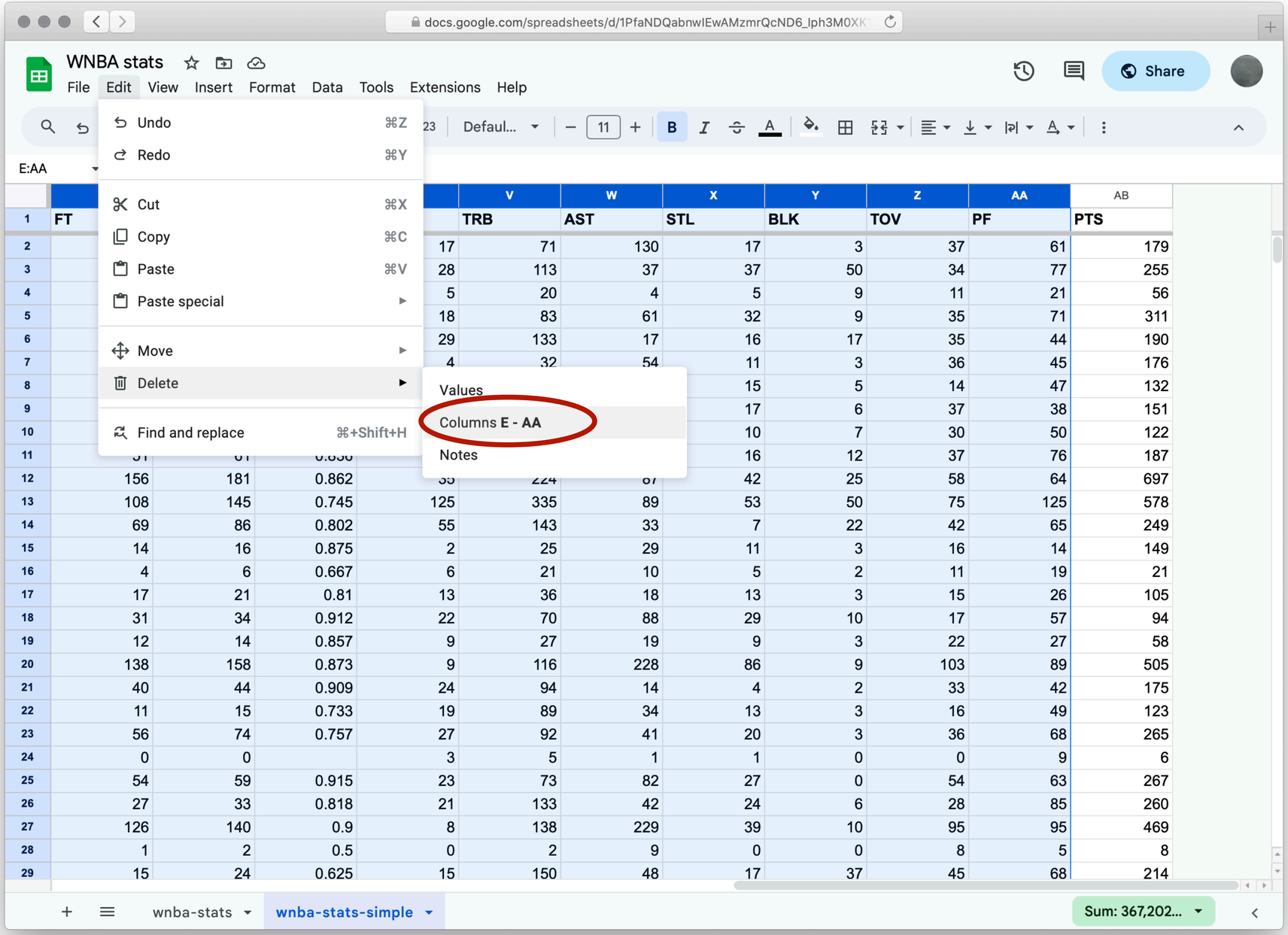
Step 1: Make a spreadsheet

Step 1½: Rethink that spreadsheet

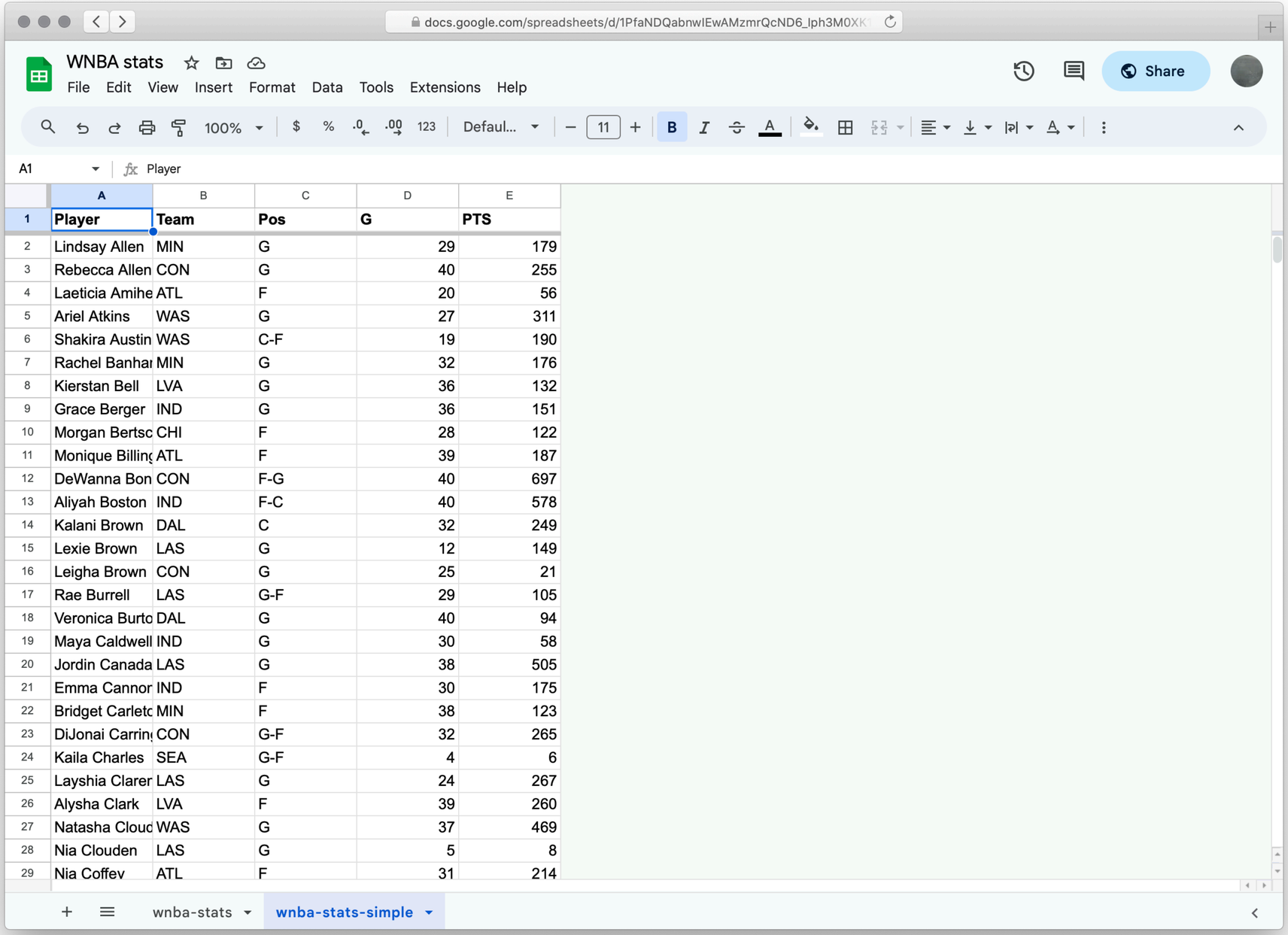
Step 2: Load the spreadsheet as a table



	Player	Team	Pos	G	MP	G	GS	MP	FG	FGA	FG%	3P
2	Lindsay Allen	MIN	G	29	698	29	20	698	65	163	0.399	7
3	Rebecca Allen	CON	G	40	858	40	27	858	98	240	0.408	40
4	Laeticia Amihe	ATL	F	20	147	20	0	147	17	42	0.405	0
5	Ariel Atkins	WAS	G	27	679	27	27	679	104	251	0.414	42
6	Shakira Austin	WAS	C-F	19	440	19	17	440	77	154	0.5	0
7	Rachel Banhar	MIN	G	32	435	32	1	435	61	165	0.37	43
8	Kierstan Bell	LVA	G	36	424	36	0	424	53	153	0.346	20
9	Grace Berger	IND	G	36	524	36	0	524	57	127	0.449	16
10	Morgan Bertsc	CHI	F	28	398	28	5	398	47	103	0.456	16
11	Monique Billing	ATL	F	39	653	39	9	653	68	167	0.407	0
12	DeWanna Bon	CON	F-G	40	1203	40	40	1203	233	548	0.425	75
13	Aliyah Boston	IND	F-C	40	1249	40	40	1249	233	403	0.578	4
14	Kalani Brown	DAL	C	32	524	32	5	524	90	143	0.629	0
15	Lexie Brown			12	364	12	11	364	54	111	0.486	27
16	Leigha Brow			25	130	25	0	130	8	26	0.308	1
17	Rae Burrell			29	322	29	3	322	36	93	0.387	16
18	Veronica Bur			40	555	40	13	555	25	85	0.294	13
19	Maya Caldw			30	304	30	1	304	21	72	0.292	4
20	Jordin Canad			38	1237	38	38	1237	163	403	0.404	41
21	Emma Cann			30	314	30	3	314	61	134	0.455	13
22	Bridget Carle			38	573	38	4	573	41	119	0.345	30
23	DiJonai Carr			32	550	32	0	550	93	223	0.417	23
24	Kaila Charles			4	41	4	0	41	3	12	0.25	0
25	Layshia Clar			24	687	24	24	687	96	193	0.497	21
26	Alysha Clark			39	876	39	1	876	91	205	0.444	51
27	Natasha Clou			37	1199	37	37	1199	149	395	0.377	45
28	Nia Clouden			5	54	5	1	54	3	10	0.3	1
29	Nia Coffey			31	680	31	31	680	83	192	0.432	33



	FT				V	W	X	Y	Z	AA	AB
1	FT				TRB	AST	STL	BLK	TOV	PF	PTS
2				17	71	130	17	3	37	61	179
3				28	113	37	37	50	34	77	255
4				5	20	4	5	9	11	21	56
5				18	83	61	32	9	35	71	311
6				29	133	17	16	17	35	44	190
7				4	32	54	11	3	36	45	176
8							15	5	14	47	132
9							17	6	37	38	151
10							10	7	30	50	122
11							16	12	37	76	187
12	156	181	0.862				42	25	58	64	697
13	108	145	0.745	125	335	89	53	50	75	125	578
14	69	86	0.802	55	143	33	7	22	42	65	249
15	14	16	0.875	2	25	29	11	3	16	14	149
16	4	6	0.667	6	21	10	5	2	11	19	21
17	17	21	0.81	13	36	18	13	3	15	26	105
18	31	34	0.912	22	70	88	29	10	17	57	94
19	12	14	0.857	9	27	19	9	3	22	27	58
20	138	158	0.873	9	116	228	86	9	103	89	505
21	40	44	0.909	24	94	14	4	2	33	42	175
22	11	15	0.733	19	89	34	13	3	16	49	123
23	56	74	0.757	27	92	41	20	3	36	68	265
24	0	0		3	5	1	1	0	0	9	6
25	54	59	0.915	23	73	82	27	0	54	63	267
26	27	33	0.818	21	133	42	24	6	28	85	260
27	126	140	0.9	8	138	229	39	10	95	95	469
28	1	2	0.5	0	2	9	0	0	8	5	8
29	15	24	0.625	15	150	48	17	37	45	68	214



	A	B	C	D	E
1	**Player**	**Team**	**Pos**	**G**	**PTS**
2	Lindsay Allen	MIN	G	29	179
3	Rebecca Allen	CON	G	40	255
4	Laeticia Amihe	ATL	F	20	56
5	Ariel Atkins	WAS	G	27	311
6	Shakira Austin	WAS	C-F	19	190
7	Rachel Banhar	MIN	G	32	176
8	Kierstan Bell	LVA	G	36	132
9	Grace Berger	IND	G	36	151
10	Morgan Bertsc	CHI	F	28	122
11	Monique Billing	ATL	F	39	187
12	DeWanna Bon	CON	F-G	40	697
13	Aliyah Boston	IND	F-C	40	578
14	Kalani Brown	DAL	C	32	249
15	Lexie Brown	LAS	G	12	149
16	Leigha Brown	CON	G	25	21
17	Rae Burrell	LAS	G-F	29	105
18	Veronica Burto	DAL	G	40	94
19	Maya Caldwell	IND	G	30	58
20	Jordin Canada	LAS	G	38	505
21	Emma Cannor	IND	F	30	175
22	Bridget Carleto	MIN	F	38	123
23	DiJonai Carrin	CON	G-F	32	265
24	Kaila Charles	SEA	G-F	4	6
25	Layshia Clarer	LAS	G	24	267
26	Alysha Clark	LVA	F	39	260
27	Natasha Cloud	WAS	G	37	469
28	Nia Clouden	LAS	G	5	8
29	Nia Coffey	ATL	F	31	214

Step 0: Get data

Step 1: Make a spreadsheet

Step 1½: Rethink that spreadsheet

Step 2: Load the spreadsheet as a table

```
include gdrive-sheets

include shared-gdrive("dcic-2021",
  "1wyQZj_L0qqV9Ekgr9au6RX2iqt2Ga8Ep")


# Load spreadsheet as a table

ssid = "1PfaNDQabnwIEwAMzmrQcND6_Iph3M0XK1YrflhLJEOs"
spreadsheet = load-spreadsheet(ssid)

stats =
  load-table:
    ...
    source: spreadsheet.sheet-by-name("wnba-stats",
        true)
  end
```

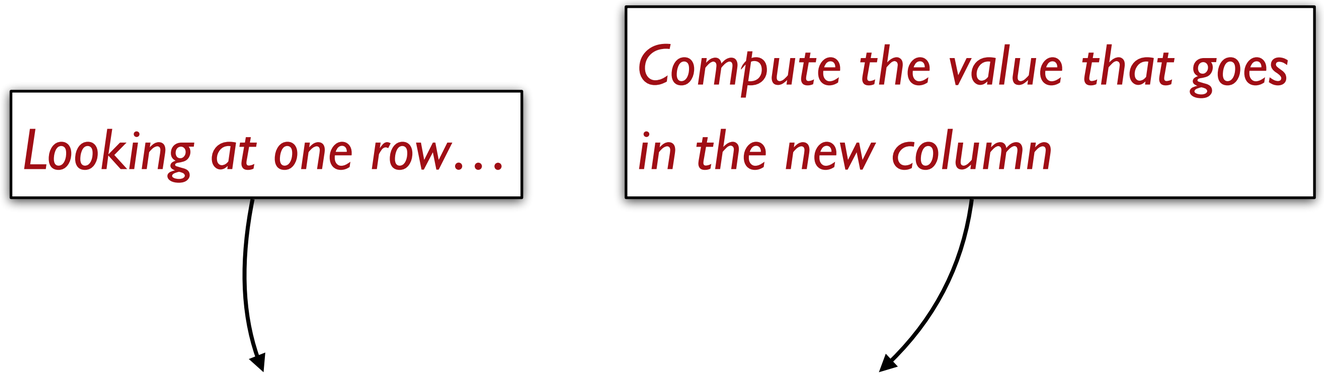
```
include gdrive-sheets

include shared-gdrive("dcic-2021",
  "1wyQZj_L0qqV9Ekgr9au6RX2iqt2Ga8Ep")


# Load spreadsheet as a table

ssid = "1PfaNDQabnwIEwAMzmrQcND6_Iph3M0XK1YrflhLJEOs"
spreadsheet = load-spreadsheet(ssid)

stats =
  load-table:
    player, team, pos, games, pts
    source: spreadsheet.sheet-by-name("wnba-stats-
simple",
        true)
  end
```

› › › **stats**

player	team	pos	games	pts
"Lindsay Allen"	"MIN"	"G"	29	179
"Rebecca Allen"	"CON"	"G"	40	255
"Laeticia Amihere"	"ATL"	"F"	20	56
"Ariel Atkins"	"WAS"	"G"	27	311
"Shakira Austin"	"WAS"	"C-F"	19	190
"Rachel Banham"	"MIN"	"G"	32	176
"Kierstan Bell"	"LVA"	"G"	36	132

Exercise: Who scores the most points per game?

To compute the average points per game for each player, we need to *build a new column*.



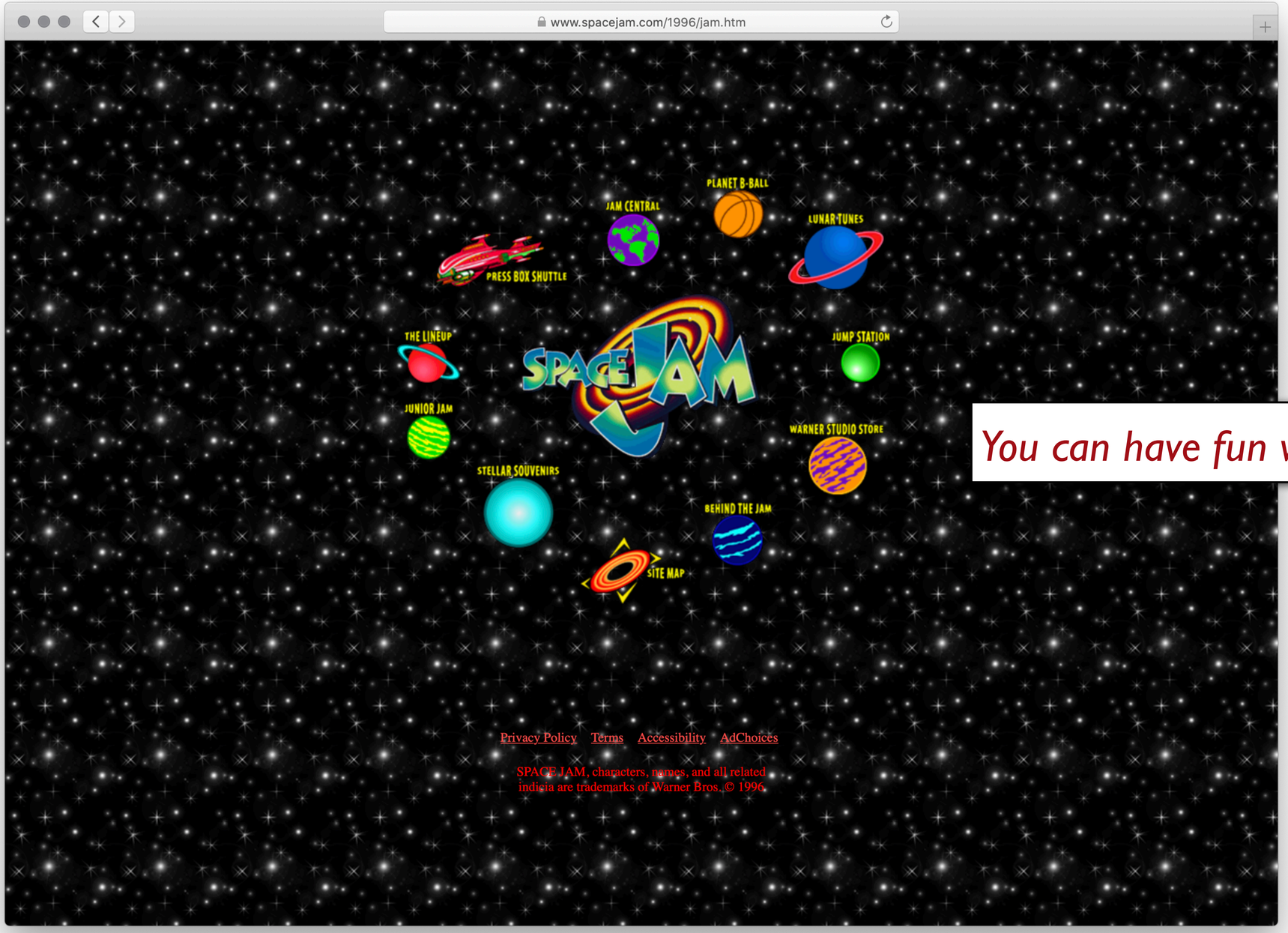

```
fun average-points(player :: Row) -> Number:
  doc: "Return the average number of points the player scored per game"
  ...
end
```

```
fun average-points(player :: Row) -> Number:
  doc: "Return the average number of points the player
scored per game"
  ...
where:
  ...
end
```

It's important to test functions – even if we're working with big tables of data!

We can test table program by using *test tables*.

These are tables that have the same *structure* as the table for our real data, but which are *smaller* and contain data that are useful for testing.



You can have fun with this. It's ok.

```
test-stats =
  table: player, team, pos, games, pts
    row: "Michael Jordan", "TUS", "F", 22, 116
    row: "Bugs Bunny", "TUS", "G", 25, 74
    row: "Nawt", "MST", "G", 9, 60
    row: "Blanko", "MST", "G", 25, 174
  end

fun average-points(player :: Row) -> Number:
  doc: "Return the average number of points the player
scored per game"
  ...
where:
  average-points(test-stats.row-n(0)) is 116 / 22
  average-points(test-stats.row-n(1)) is 74 / 25
end
```

```
test-stats =
  table: player, team, pos, games, pts
    row: "Michael Jordan", "TUS", "F", 22, 116
    row: "Bugs Bunny", "TUS", "G", 25, 74
    row: "Nawt", "MST", "G", 9, 60
    row: "Blanko", "MST", "G", 25, 174
  end

fun average-points(player :: Row) -> Number:
  doc: "Return the average number of points the player
scored per game"
  player["pts"] / player["games"]
where:
  average-points(test-stats.row-n(0)) is 116 / 22
  average-points(test-stats.row-n(1)) is 74 / 25
end
```

```
››› build-column(stats, "avg", average-points)
```

```
››› build-column(stats, "avg", average-points)
```

Name of the new column

```
››› build-column(stats, "avg", average-points)
```

Name of the new column

Name of the function to use

```
››› build-column(stats, "avg", average-points)
```

player	team	pos	games	pts	avg
"Lindsay Allen"	"MIN"	"G"	29	179	179/29
"Rebecca Allen"	"CON"	"G"	40	255	6.375
"Laeticia Amihere"	"ATL"	"F"	20	56	2.8
"Ariel Atkins"	"WAS"	"G"	27	311	$11.\overline{518}$
"Shakira Austin"	"WAS"	"C-F"	19	190	10
"Rachel Banham"	"MIN"	"G"	32	176	5.5

We can sort by the values in our new column, but first let's give a name to that table:

```
stats-with-avgs =
  build-column(stats, "avg", average-points)
```

We can sort by the values in our new column, but first let's give a name to that table:

```
stats-with-avgs =
  build-column(stats, "avg", average-points)
```

```
››› order-by(stats-with-avgs, "avg", false)
```

player	team	pos	games	pts	avg
"Jewell Loyd"	"SEA"	"G"	38	939	24.7105263157894736842
"Breanna Stewart"	"NYL"	"F"	40	919	22.975
"A'ja Wilson"	"LVA"	"F"	40	912	22.8
"Napheesa Collier"	"MIN"	"F"	37	796	21.513
"Arike Ogunbowale"	"DAL"	"G"	40	849	21.225

How does Breanna compare with other NY Liberty players?

player	team	pos	games	pts	avg
"Jewell Loyd"	"SEA"	"G"	38	939	24.710526315789473684
"Breanna Stewart"	"NYL"	"F"	40	919	22.975
"A'ja Wilson"	"LVA"	"F"	40	912	22.8
"Napheesa Collier"	"MIN"	"F"	37	796	21.513
"Arike Ogunbowale"	"DAL"	"G"	40	849	21.225

```
stats-with-avgs =
  build-column(stats, "avg", average-points)

top-scorers =
  order-by(stats-with-avgs, "avg", false)
```

```
››› fun nyl(player): player["team"] == "NYL" end
```

```
››› fun nyl(player): player["team"] == "NYL" end
››› filter-with(top-scorers, nyl)
```

player	team	pos	games	pts	avg
"Breanna Stewart"	"NYL"	"F"	40	919	22.975
"Sabrina Ionescu"	"NYL"	"G"	36	613	$17.02\overline{7}$
"Betnijah Laney"	"NYL"	"G-F"	40	513	12.825
"Jonquel Jones"	"NYL"	"F"	40	453	11.325
"Courtney Vandersloot"	"NYL"	"G"	39	410	$10.\overline{512820}$
"Marine Johannes"	"NYL"	"G"	35	249	$7.1\overline{142857}$

Exercise: Generalizing the question

For *any* given team, who scores the most points per game?

Inputs

player	team	pos	games	pts
"Lindsay Allen"	"MIN"	"G"	29	179
"Rebecca Allen"	"CON"	"G"	40	255
"Laeticia Amihere"	"ATL"	"F"	20	56
"Ariel Atkins"	"WAS"	"G"	27	311
"Shakira Austin"	"WAS"	"C-F"	19	190
"Rachel Banham"	"MIN"	"G"	32	176
"Kierstan Bell"	"LVA"	"G"	36	132
"Grace Berger"	"IND"	"G"	36	151
"Morgan Bertsch"	"CHI"	"F"	28	122
"Monique Billings"	"ATL"	"F"	39	187

Click to show the remaining 165 rows...

"NYL"

Output

"Breanna Stewart"

Inputs

player	team	pos	games	pts
"Lindsay Allen"	"MIN"	"G"	29	179
"Rebecca Allen"	"CON"	"G"	40	255
"Laeticia Amihere"	"ATL"	"F"	20	56
"Ariel Atkins"	"WAS"	"G"	27	311
"Shakira Austin"	"WAS"	"C-F"	19	190
"Rachel Banham"	"MIN"	"G"	32	176
"Kierstan Bell"	"LVA"	"G"	36	132
"Grace Berger"	"IND"	"G"	36	151
"Morgan Bertsch"	"CHI"	"F"	28	122
"Monique Billings"	"ATL"	"F"	39	187

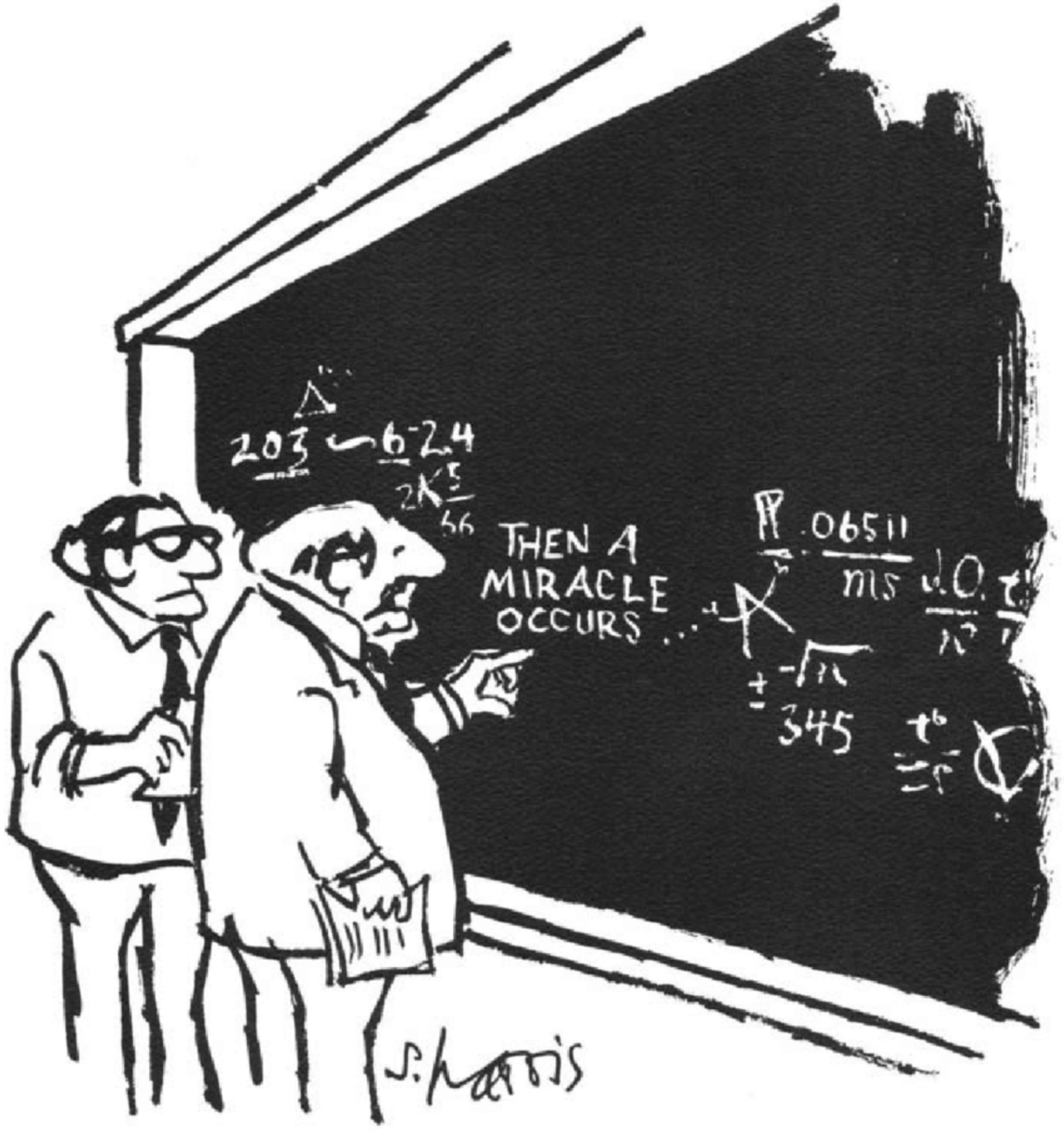
Click to show the remaining 165 rows...

"NYL"

?

Output

"Breanna Stewart"



"I THINK YOU SHOULD BE MORE EXPLICIT HERE IN STEP TWO."

Sydney Harris

If you aren't sure how to approach a problem, don't start by trying to write code!

Plan until you understand the problem.

player	*team*	*pos*	*games*	*pts*
Michael Jordan	TUS	F	22	116
Bugs Bunny	TUS	G	25	74
Nawt	MST	G	9	60
Blanko	MST	G	25	174

```
"TUS"
```

player	*team*	*pos*	*games*	*pts*
Michael Jordan	TUS	F	22	116
Bugs Bunny	TUS	G	25	74
Nawt	MST	G	9	60
Blanko	MST	G	25	174

`"TUS"`

player	*team*	*pos*	*games*	*pts*
Michael Jordan	TUS	F	22	116
Bugs Bunny	TUS	G	25	74

player	*team*	*pos*	*games*	*pts*
Michael Jordan	TUS	F	22	116
Bugs Bunny	TUS	G	25	74
Nawt	MST	G	9	60
Blanko	MST	G	25	174

`"TUS"`

`filter-with`

player	*team*	*pos*	*games*	*pts*
Michael Jordan	TUS	F	22	116
Bugs Bunny	TUS	G	25	74

`build-column`

player	*team*	*pos*	*games*	*pts*	*avg*
Michael Jordan	TUS	F	22	116	5.27
Bugs Bunny	TUS	G	25	74	296

player	*team*	*pos*	*games*	*pts*
Michael Jordan	TUS	F	22	116
Bugs Bunny	TUS	G	25	74

`build-column`

player	*team*	*pos*	*games*	*pts*	*avg*
Michael Jordan	TUS	F	22	116	5.27
Bugs Bunny	TUS	G	25	74	2.96

`order-by`

player	*team*	*pos*	*games*	*pts*	*avg*
Michael Jordan	TUS	F	22	116	5.27
Bugs Bunny	TUS	G	25	74	2.96

player	*team*	*pos*	*games*	*pts*
Michael Jordan	TUS	F	22	116
Bugs Bunny	TUS	G	25	74

`build-column`

player	*team*	*pos*	*games*	*pts*	*avg*
Michael Jordan	TUS	F	22	116	5.27
Bugs Bunny	TUS	G	25	74	2.96

`order-by`

player	*team*	*pos*	*games*	*pts*	*avg*
Michael Jordan	TUS	F	22	116	5.27
Bugs Bunny	TUS	G	25	74	2.96

`.row-n(0)`

Michael Jordan	TUS	F	22	116	5.27

player	*team*	*pos*	*games*	*pts*
Michael Jordan	TUS	F	22	116
Bugs Bunny	TUS	G	25	74

`build-column`

player	*team*	*pos*	*games*	*pts*	*avg*
Michael Jordan	TUS	F	22	116	5.27
Bugs Bunny	TUS	G	25	74	2.96

`order-by`

player	*team*	*pos*	*games*	*pts*	*avg*
Michael Jordan	TUS	F	22	116	5.27
Bugs Bunny	TUS	G	25	74	2.96

`.row-n(0)`

Michael Jordan	TUS	F	22	116	5.27

`["player"]`

`"Michel Jordan"`

That’s a plan; let’s implement it!

```
test-stats =
  table: player, team, pos, games, pts
    row: "Michael Jordan", "TUS", "F", 22, 116
    row: "Bugs Bunny", "TUS", "G", 25, 74
    row: "Nawt", "MST", "G", 9, 60
    row: "Blanko", "MST", "G", 25, 174
  end

fun top-scorer-on-team(players :: Table, team :: String) -> String:
  doc: "Return the name of the player on the given team with the highest
average points per game"
  ...
end
```

```
test-stats =
  table: player, team, pos, games, pts
    row: "Michael Jordan", "TUS", "F", 22, 116
    row: "Bugs Bunny", "TUS", "G", 25, 74
    row: "Nawt", "MST", "G", 9, 60
    row: "Blanko", "MST", "G", 25, 174
  end

fun top-scorer-on-team(players :: Table, team :: String) -> String:
  doc: "Return the name of the player on the given team with the highest
average points per game"
  ...
where:
  top-scorer-on-team(test-stats, "TUS") is "Michael Jordan"
  top-scorer-on-team(test-stats, "MST") is "Blanko"
end
```

```
test-stats = ...

fun top-scorer-on-team(players :: Table, team :: String) -> String:
  doc: "Return the name of the player on the given team with the highest
average points per game"
  ...
where:
  top-scorer-on-team(test-stats, "TUS") is "Michael Jordan"
  top-scorer-on-team(test-stats, "MST") is "Blanko"
end
```

```
test-stats = ...

fun top-scorer-on-team(players :: Table, team :: String) -> String:
  doc: "Return the name of the player on the given team with the highest
average points per game"
  ...
where:
  top-scorer-on-team(test-stats, "TUS") is "Michael Jordan"
  top-scorer-on-team(test-stats, "MST") is "Blanko"
end

fun top-scorer(players :: Table) -> String:
  ...
where:
  top-scorer(test-stats) is "Blanko"
  # Ideally, add at least one more test case...
end
```

```
test-stats = ...

fun top-scorer-on-team(players :: Table, team :: String) -> String:
  doc: "Return the name of the player on the given team with the highest
average points per game"
  ...
where:
  top-scorer-on-team(test-stats, "TUS") is "Michael Jordan"
  top-scorer-on-team(test-stats, "MST") is "Blanko"
end
```

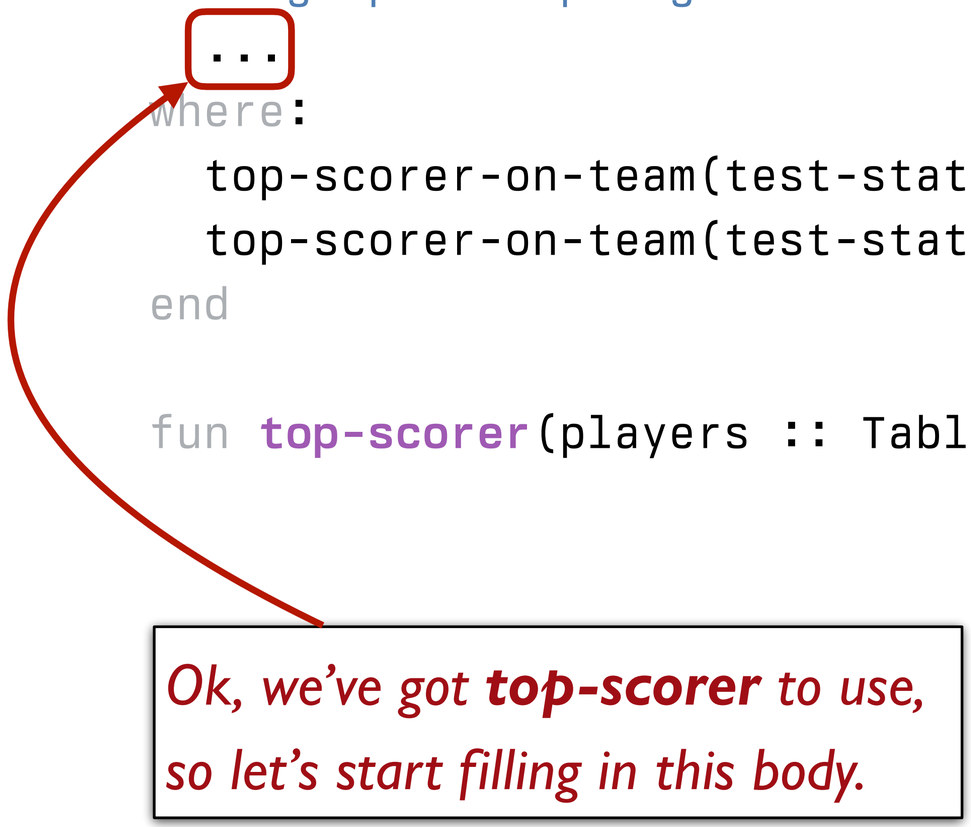
```
fun top-scorer(players :: Table) -> String:
  doc: "Return the name of the player with the highest average number of
points"
  ...
where:
  top-scorer(test-stats) is "Blanko"
  # Ideally, add at least one more test case...
end
```

This is just putting the expressions we wrote before into a function and then returning the name of the player in the first row.

```
test-stats = ...

fun top-scorer-on-team(players :: Table, team :: String) -> String: ... end

fun top-scorer(players :: Table) -> String:
  doc: "Return the name of the player with the highest average number of points"
  ...
where:
  top-scorer(test-stats) is "Blanko"
  # Ideally, add at least one more test case...
end
```

```
test-stats = ...

fun top-scorer-on-team(players :: Table, team :: String) -> String: ... end

fun top-scorer(players :: Table) -> String:
  doc: "Return the name of the player with the highest average number of points"

  players-with-avgs =
    build-column(players, "avg", average-points)

  sorted-by-avg =
    order-by(players-with-avgs, "avg", false)

  top-player = sorted-by-avg.row-n(0)

  top-player["player"]
where:
  top-scorer(test-stats) is "Blanko"
  # Ideally, add at least one more test case...
end
```

```
test-stats = ...

fun top-scorer-on-team(players :: Table, team :: String) -> String:
  doc: "Return the name of the player on the given team with the highest
average points per game"
  ...
where:
  top-scorer-on-team(test-stats, "TUS") is "Michael Jordan"
  top-scorer-on-team(test-stats, "MST") is "Blanko"
end

fun top-scorer(players :: Table) -> String: ... end
```



```
test-stats = ...

fun top-scorer-on-team(players :: Table, team :: String) -> String:
  doc: "Return the name of the player on the given team with the highest
average points per game"
  team-players = ...
  top-scorer(team-players)
where:
  top-scorer-on-team(test-stats, "TUS") is "Michael Jordan"
  top-scorer-on-team(test-stats, "MST") is "Blanko"
end

fun top-scorer(players :: Table) -> String: ... end
```

```
test-stats = ...

fun top-scorer-on-team(players :: Table, team :: String) -> String:
  doc: "Return the name of the player on the given team with the highest
average points per game"
  team-players = filter-with(players, is-on-team)
  top-scorer(team-players)
where:
  top-scorer-on-team(test-stats, "TUS") is "Michael Jordan"
  top-scorer-on-team(test-stats, "MST") is "Blanko"
end

fun is-on-team(player :: Row) -> Boolean:
  doc: "Return true if the player is on the team we're interested in"
  player["team"] == team
end

fun top-scorer(players :: Table) -> String: ... end
```

code.pyret.org/editor

View File Insert Run Stop

```
31
32
33 fun average-points(player :: Row) -> Number:
34   doc: "Return the average number of points the player
     scored per game"
35   player["pts"] / player["games"]
36 where:
37   average-points(test-stats.row-n(0)) is 116 / 22
38   average-points(test-stats.row-n(1)) is 74 / 25
39 end
40
41
42 #
43 # Who is the individual top scorer for a given team?
44 #
45
46 fun is-on-team(player :: Row) -> Boolean:
47   doc: "Return true if the player is on the team we're
     interested in"
48   player["team"] == team
49 end
50
51
52
53 fun top-scorer-on-team(players :: Table, team :: String) ->
     String:
54   doc: "Return the name of the player on the given team with
     the highest average points per game"
55
56   team-players = filter-with(players, is-on-team)
57
58   top-scorer(team-players)
59
60 where:
61   top-scorer-on-team(test-stats, "TUS") is "Michael Jordan"
62   top-scorer-on-team(test-stats, "MST") is "Blanko"
63 end
64
65
66 fun top-scorer(players :: Table) -> String:
67   doc: "Return the name of the player with the highest
     average number of points"
68
69   players-with-avgs =
70     build-column(players, "avg", average-points)
```

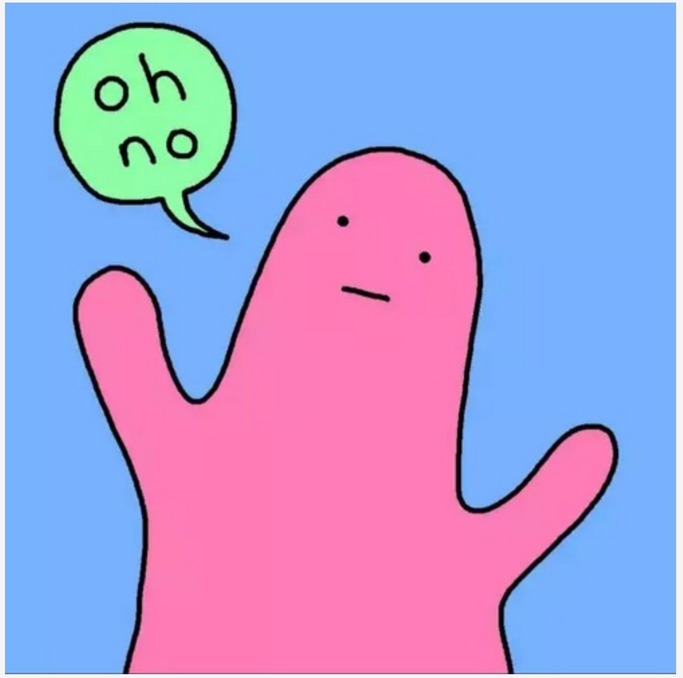
The identifier `team` is unbound:

definitions://:47:20-47:24

```
48   player["team"] == team
```

It is used but not previously defined.

›››



Programming as jgordon@vassar.edu.

Alex Norris

```
test-stats = ...

fun top-scorer-on-team(players :: Table, team :: String) -> String:
  doc: "Return the name of the player on the given team with the highest
average points per game"
  team-players = filter-with(players, is-on-team)
  top-scorer(team-players)
where:
  top-scorer-on-team(test-stats, "TUS") is "Michael Jordan"
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end

fun is-on-team(player :: Row) -> Boolean:
  doc: "Return true if the player is on the team we're interested in"
  player["team"] == team
end

fun top-scorer(players :: Table) -> String: ... end
```

team *is only defined inside this function*

But we're trying to use it here!

```
test-stats = ...

fun top-scorer-on-team(players :: Table, team :: String) -> String:
  doc: "Return the name of the player on the given team with the highest
average points per game"

  fun is-on-team(player :: Row) -> Boolean:
    doc: "Return true if the player is on the team we're interested in"
    player["team"] == team
  end

  team-players = filter-with(players, is-on-team)
  top-scorer(team-players)
where:
  top-scorer-on-team(test-stats, "TUS") is "Michael Jordan"
  top-scorer-on-team(test-stats, "MST") is "Blanko"
end



fun top-scorer(players :: Table) -> String: ... end
```

```
test-table = ...
```

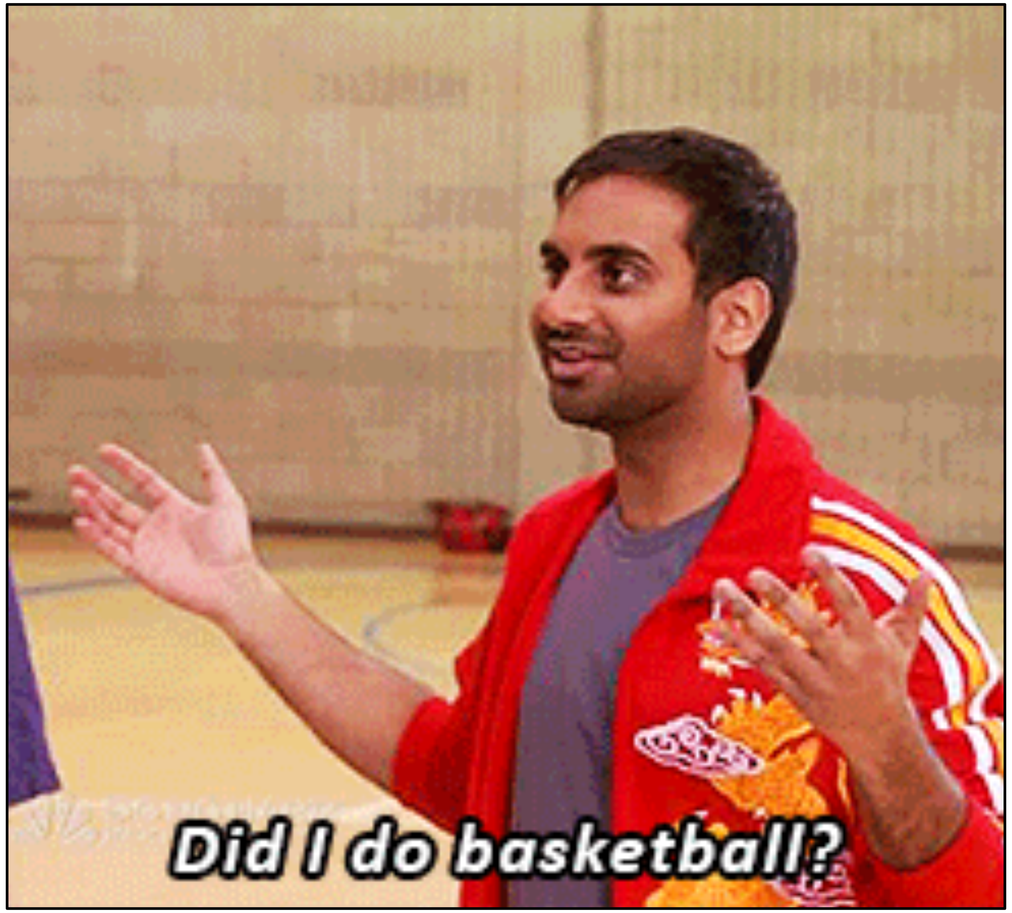
```
fun top-scorer-on-team(players :: Table, team :: String) -> String:
  doc: "Return the name of the player on the given team with the highest
average points per game"

  fun is-on-team(player :: Row) -> Boolean:
    doc: "Return true if the player is on the team we're interested in"
    player["team"] == team
  end

  team-players = filter-with(players, is-on-team)
  top-scorer(team-players)
where:
  top-scorer-on-team(test-stats, "TUS") is "Michael Jordan"
  top-scorer-on-team(test-stats, "MST") is "Blanko"
end
```

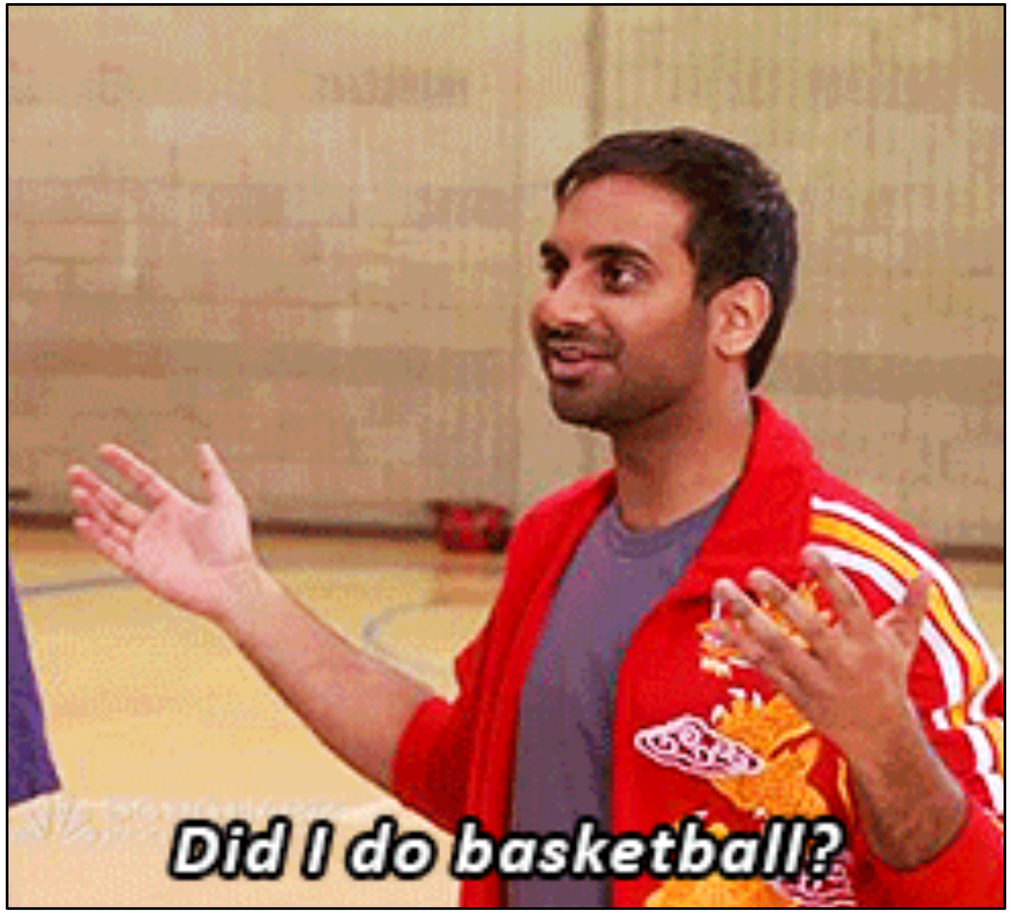
*We can nest function definitions, so now the team that **is-on-team** is considering is whatever team was passed to **top-scorer-on-team**.*

```
fun top-scorer(players :: Table) -> String: ... end
```

Class code:

tinyurl.com/101-2024-02-01


Did I do basketball?


Did I do basketball?

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Kathi Fisler and colleagues, Brown University

Sydney Harris

Alex Norris, *Webcomic Name*

Suraj Rampure and colleagues, University of California, Berkeley

basketball-reference.com

Back to the Future Part II