INFO101: Tabular Data

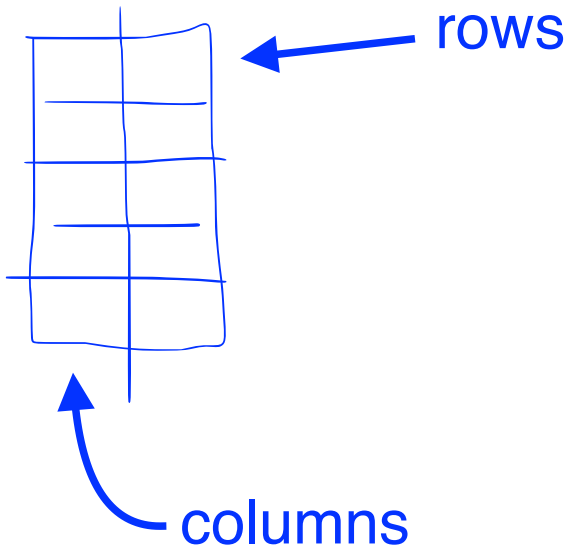
What makes data tidy?

MARINCS 100B | Intro to Marine Data Science | Winter 2025

Key concepts

make it a rectangle
don’t confuse the computer
consistent names and form

Make it a rectangle



	A	B	C
1	site	species	count
2	Santa Rosa	blue	3
3	Santa Rosa	fin	4
4	Santa Rosa	humpback	2
5	San Miguel	blue	4
6	San Miguel	fin	6
7	San Miguel	humpback	4
8	Santa Cruz	blue	5
9	Santa Cruz	fin	10
10	Santa Cruz	humpback	9

species

count

one column per information type

Non-rectangular examples

	A	B	C	D	E
1			species		
2			blues	fins	humpbacks
3		Santa Rosa	3	4	5
4	sites	San Miguel	4	6	10
5		Santa Cruz	2	4	9

multiple lines of headers

technically a rectangle

	A	B	C	D
1	site	blues	fins	humpbacks
2	Santa Rosa	3	4	5
3	San Miguel	4	6	10
4	Santa Cruz	2	4	9

actually a variable

"wide format"

Don’t confuse the computer

column names look like variable names

cells contain 1 value of 1 type of data

	A	B	C
1	latitude	depth_m	temp_c
2	45	5	10.6
3	45	100	7.1
4	30	5	21.8
5	30	100	18.3
6	15	5	27.1
7	15	100	22.6

Confusing examples

latitude	depth	temp (°C)
45	5m	10.6
45	100m	7.1
30	5m	21.8
30	100m	18.3
15	5m	27.1
15	100m	22.6

space
degree
parantheses

number

letter

5m

latitude	5m	100m
45	10.6	7.1
30	21.8	18.3
15	27.1	22.6

wide format

Consistent names and formats

column names to be readable and consistent in their formatting

	A	B	C
1	date	air_temp_c	water_temp_c
2	2024-03-01	14.1	10.3
3	2024-03-02	NA	NA
4	2024-03-03	16.3	11.5
5	2024-03-04	17.8	11.2

Dates etc should follow universal conventions

missing values are clearly indicated

Inconsistent examples

snake case

camel case

date	air_temp_c	waterTempC
3/1/24	14.1	10.3
3/2/24	No survey	-
Mar 3 24	16.3	11.5
2024-03-04	17.8	11.2

missing values
"no survey", -

Recap

Tidy data rules:
make it a rectangle
don’t confuse the computer
consistent names and formats

New vocabulary and lingering questions

New vocabulary

Lingering questions

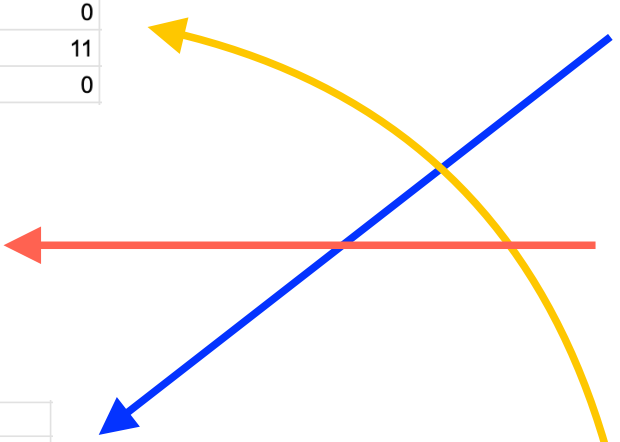
Exercises

Match the tables to the tidy rule they violate

l1	l2	b	c
-124.2	40.8	1	0
-124.3	40.7	1	0
-124.4	40.6	1	11
-124.5	40.5	2	0

location	beaufort_state	count
-124.2, 40.8	1	0
-124.3, 40.7	1	0
-124.4, 40.6	1	11
-124.5, 40.5	2	0

# Marbled Murrelet at-sea survey data May 2015			
# Data collected by AJR, WEP, and LSI			
lon	lat	beaufort_state	count
-124.2	40.8	1	0
-124.3	40.7	1	0
-124.4	40.6	1	11
-124.5	40.5	2	0



Rule 1 - make it a rectangle

Rule 2 - don’t confuse the computer

Rule 3 - use consistent names and formats

INFO101: Tabular Data

Creating and importing data frames in R

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Key concepts

"data frames" workhorses of data science

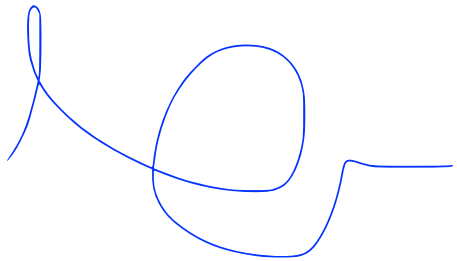
DFs are 2D w/ rows and columns

create DFs manually, more often we'll import them from a file

Two views, same data

latitude	depth_m	temp_c
45	5	10.6
45	100	7.1
30	5	21.8
30	100	18.3

spreadsheet software view



data frame in R (see vid)

Creating a data frame

Demo in R

how to create and import data frames

New vocabulary and lingering questions

New vocabulary

Lingering questions

Exercises

Complete the exercises in exercises/exercises101b.R

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Indexing data frames

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Key concepts

index w/ []
BUT in 2D -> [row, column]

How to index into data frames

noaa_survey

latitude	depth_m	temp_c
45	5	10.6
45	100	7.1
30	5	21.8
30	100	18.3

index -> cell

latitude	depth_m	temp_c
1,1	1,2	1,3
2,1	2,2	2,3
3,1	3,2	3,3
4,1	4,2	4,3

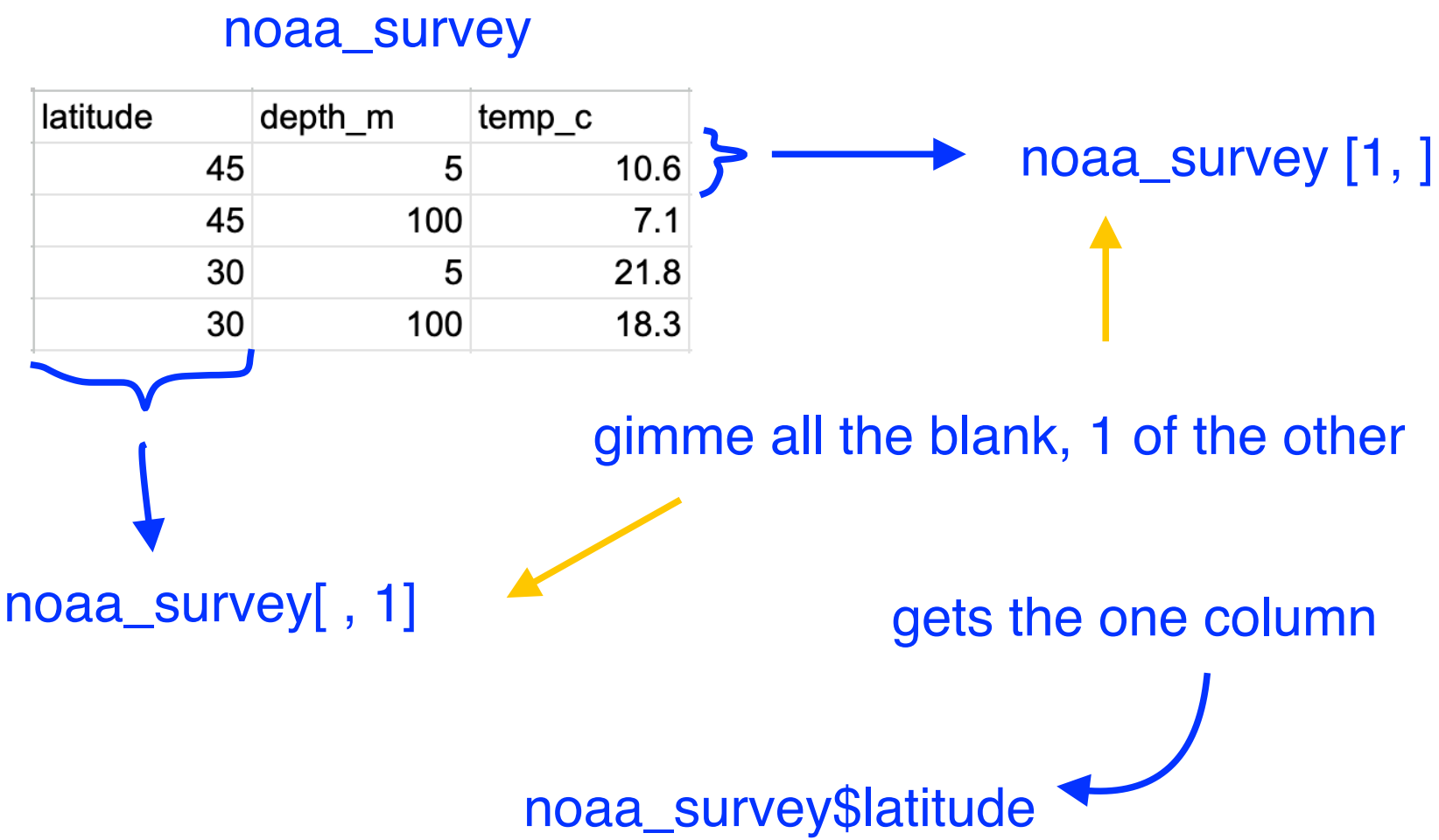
noaa_survey[1,1]

[2, 1:2]

etc

noaa_survey[4,1] ← 50

Pull rows and columns from data frames



Filtering rows

don’t forget the comma!!!

noaa_survey

latitude	depth_m	temp_c
45	5	10.6
45	100	7.1
30	5	21.8
30	100	18.3

```
noaa_survey[noaa_survey$latitude == 45, ]
```

filtering the data frame to give all values where latitude = 45

New vocabulary and lingering questions

New vocabulary

buck

Lingering questions

Exercises

Complete the exercises in exercises/exercises101c.R