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Exercise Your Mind

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Pandas Brain Teasers

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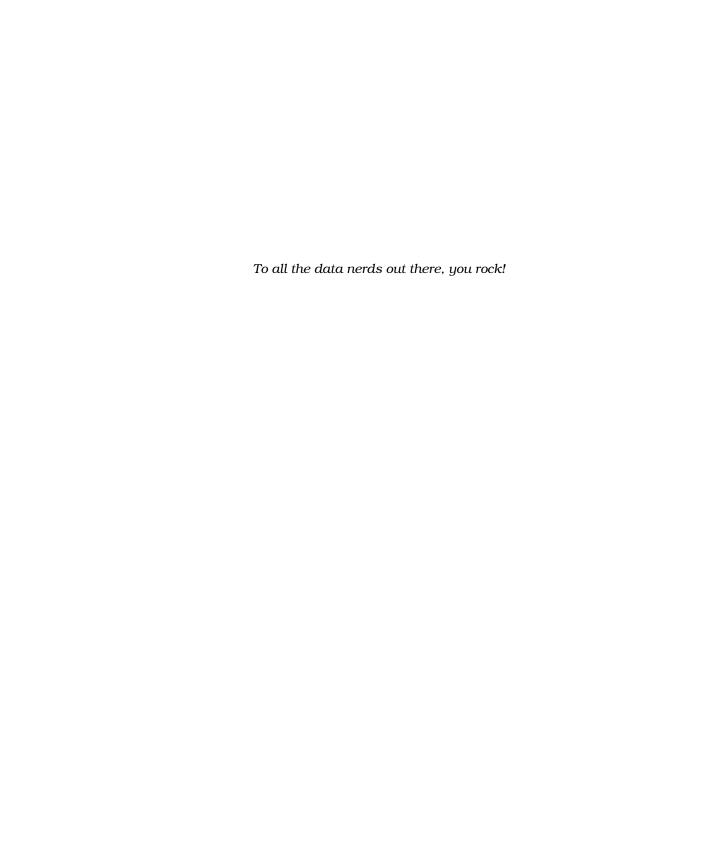
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Puzzle 18

Off with Their NaNs

not_nan.py import numpy as np import pandas as pd s = pd.Series([1, np.nan, 3])

print(s[~(s == np.nan)])

Guess the Output



Try to guess what the output is before moving to the next page.

This code will print:

0 1.0 1 NaN 2 3.0 dtype: float64

We covered some of the floating-point oddities in the puzzle <u>Multiplying</u>. NaN (or np.nan) is another oddity. The name NaN stands for *not a number*. It serves two purposes: illegal computation and missing values.

Here's an example of a bad computation:

```
In [1]: np.float64(0)/np.float64(0)
  RuntimeWarning: invalid value encountered in \
  double_scalars np.float64(0)/np.float64(0)
Out[1]: nan
```

You see a warning but not an exception, and the return value is nan.

nan does not equal any number, including itself.

```
In [2]: np.nan == np.nan
Out[2]: False
```

To check that a value is nan, you need to use a special function such as pandas.isnull:

```
In [3]: pd.isnull(np.nan)
Out[3]: True
```

You can use pandas.isnull to fix this teaser.

```
not_nan_fixed.py
import numpy as np
import pandas as pd
s = pd.Series([1, np.nan, 3])
print(s[~pd.isnull(s)])
```

pandas.isnull works with all Pandas "missing" values: None, pandas.NaT (not a time), and the new pandas.NA.

Floating points have several other special "numbers" such as inf (infinity), -inf, -0, +0, and others. You can learn more about them in the following links.

Further Reading

pandas.isnull in the Pandas Documentation pandas.pydata.org/pandas-docs/stable/reference/api/pandas.isnull.html

- Experimental NA Scalar to Denote Missing Values in the Pandas Documentation pandas.pydata.org/pandas-docs/stable/user_guide/missing_data.html#missing-data-na
- Floating-Point Arithmetic: Issues and Limitations in the Python Documentation docs.python.org/3/tutorial/floatingpoint.html
- floating point zine by Julia Evans twitter.com/b0rk/status/986424989648936960
- What Every Computer Scientist Should Know About Floating-Point Arithmetic docs.oracle.com/cd/E19957-01/806-3568/ncg_goldberg.html