Python test drive

MCSB Bootcamp — Mathematical and Computational Track

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What this notebook is for

Scaffolding, not teaching material. It exists to prove that the four things a lecture notebook needs to do all work, in all five output formats, before any real content is written into one.

Those four things are the four code chunks below. Two of them run when the site is built, and you are reading their results. Two of them do not, and are waiting for you to run them.

A chunk that runs and produces a number

This one executes during the build. The value below was computed on the machine that built this page, not typed in by hand.

```
import numpy as np

# A number with enough decimals that it could not plausibly have been written out by hand.
# If the build is executing code, this is the reciprocal of the golden ratio; if it is not, t
phi = (1 + np.sqrt(5)) / 2
print(f"1/phi = {1 / phi:.12f}")
```

```
1/phi = 0.618033988750
```

A chunk that runs and produces a figure

Also executed at build time. The figure is generated, not a file committed to the repository — which is the whole point of the exercise, and the thing that distinguishes these notebooks from the projects.

```
import matplotlib.pyplot as plt

t = np.linspace(0, 10, 400)

fig, ax = plt.subplots(figsize=(5.5, 3.2))
for k in (1.0, 0.5, 0.25):
    ax.plot(t, np.exp(-k * t), label=f"$k = {k}$")

ax.set_xlabel("time $t$")
ax.set_ylabel("$e^{-kt}$")
ax.set_xlim(0, 10)
ax.set_ylim(0, 1)
ax.legend(frameon=False)
fig.tight_layout()
plt.show()
```

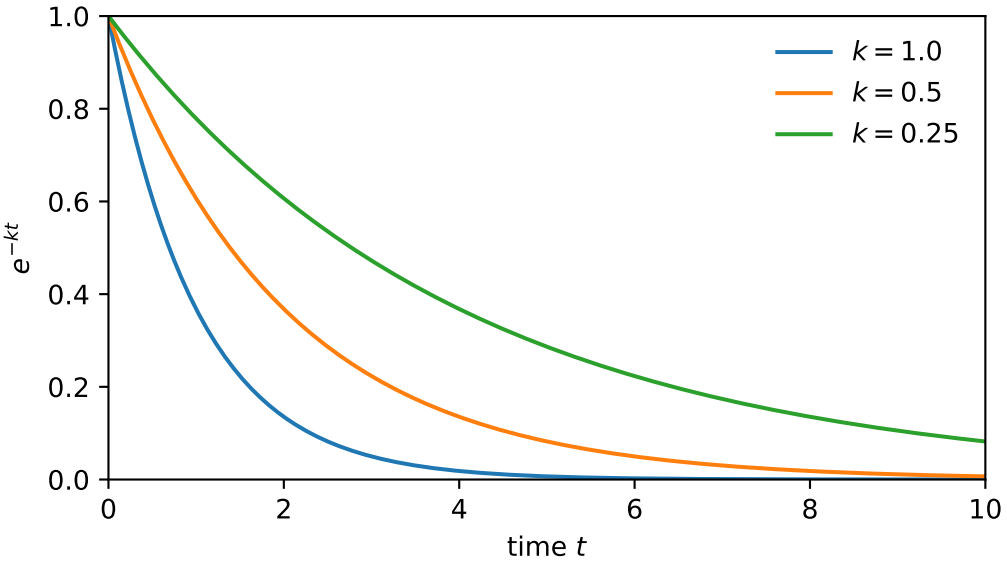


Figure 1: Exponential decay at three rates. Generated at build time by matplotlib.

A chunk that is complete, but left for you to run

The code below is finished and correct. It is deliberately *not* executed when the site is built, so there is no output here to read — running it is your job, and it is the simplest test of whether your setup actually works.

Open this notebook's `.ipynb` version, put your cursor in the cell, and run it.

```
# Should print the same value as the first chunk above.
# If it does, your environment is running the same numpy the build did.
import numpy as np

phi = (1 + np.sqrt(5)) / 2
print(f"1/phi = {1 / phi:.12f}")
print(f"numpy {np.__version__}")
```

A chunk that is yours to write

Yours to fill in. Plot $\sin(t)$ against t over the same range as the figure above, using whatever you can remember or work out from the second chunk.

A chunk holding nothing but a comment is still a chunk; a chunk holding nothing at all is dropped from every output, so a stub always needs at least one line in it.

```
# Your code here.
```

What should be true

If the pipeline is working, then in the `html` and `pdf` versions of this page the first two chunks show their results and the last two show only code. In the `.ipynb` version all four arrive as runnable code cells, and "Run All" completes without error.