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15.2.2 Uniform Distribution

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MO2.3 MO2.13

In Chapter 14, we introduced probabilistic thinking using uniform distributions in which a parameter (i.e. a random variable) was assumed to be equally likely to occur between to limiting values x_{min} and x_{max}. A sketch of the PDF for a uniform distribution is shown in Figure 15.2. For $x_{\text{min}} < x < x_{\text{max}}$, the density has a constant value $f = h$. The value of h is not arbitrary, rather it is determined by Equation 15.4:

$$1 = \int_{-\infty}^{+\infty} f(\xi)\, \mathrm{d}\xi = \int_{x_{\text{min}}}^{x_{\text{max}}} f(\xi)\, \mathrm{d}\xi = h \int_{x_{\text{min}}}^{x_{\text{max}}} \mathrm{d}\xi = h \times (x_{\text{max}} - x_{\text{min}}) \tag{15.6}$$

$$\Rightarrow h = 1/\left(x_{\text{max}} - x_{\text{min}}\right) \tag{15.7}$$

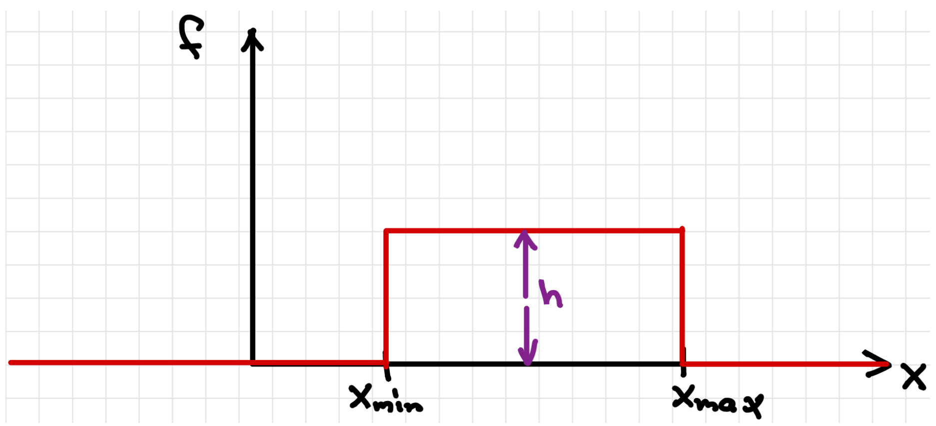

Figure 15.2: Uniform distribution. $h = 1/\left(x_{\text{max}} - x_{\text{min}}\right)$.

NumPy can be used to generate uniformly distributed random numbers by calling the `uniform` method in the Numpy default random number generator class:

```
import numpy as np

# xmin, xmax, and shape must be defined!

rng = np.random.default_rng()
```