15.2.7 Triangular distribution

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Another commonly used distribution is the triangular distribution. Not surprisingly, as shown in Figure 15.4, the shape of the density function is triangular, with the peak of the density occurring at the so-called most-probable point, x_{mpp}. As for the uniform distribution, the density f_{mpp} is not arbitrary and can be determined by Equation 15.4:

$$1 = \int_{-\infty}^{+\infty} f(\xi)\ \mathrm{d}\xi = \int_{x_{\min}}^{x_{\max}} f(\xi)\ \mathrm{d}\xi = \frac{1}{2} f_{\mathrm{mpp}} \times (x_{\max} - x_{\min}) \tag{15.10}$$

$$\Rightarrow f_{\mathrm{mpp}} = 2/(x_{\max} - x_{\min}) \tag{15.11}$$

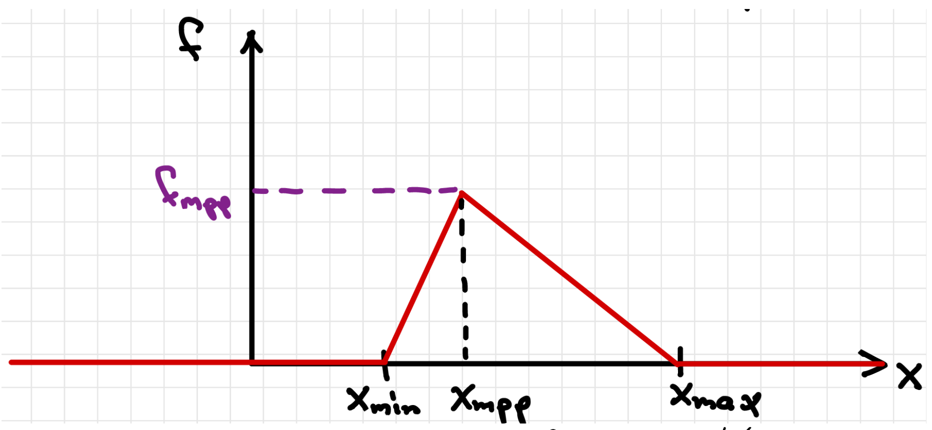

Figure 15.4: Triangular distribution. $f_{\mathrm{mpp}} = 2/(x_{\max} - x_{\min})$

The triangular distribution is most frequently used when information about the distribution of a random variable is limited to a general sense of what the minimum ($x_{\min}$), maximum ($x_{\max}$) and most probable (x_{mpp}) values are.

NumPy can be used to generate random numbers with a triangular distribution by calling the `triangular` method in the Numpy default random number generator class:

```
import numpy as np

# xmin, xmpp, xmax, and shape must be defined!

rng = np.random.default_rng()
X = rng.triangular(xmin, xmpp, xmax, shape)
```

where shape again is an integer or tuple giving the shape of the returned