1 Same mean and variance for different PDFs

Consider the uniform distribution U (same as **??**)

$$U(x; a, b) = \begin{cases} \frac{1}{b-a} & \text{if } x \in [a, b] \\ 0 & \text{otherwise} \end{cases} \tag{1}$$

Consider the normal distribution N given by

$$N(x; \mu, \sigma^2) = \frac{1}{\sqrt{2\pi\sigma^2}} \exp\left(-\frac{(x-\mu)^2}{2\sigma^2}\right) \tag{2}$$

As observable, the normal distribution is explicitly parameterized by mean μ and variance σ^2, whereas the uniform distribution has mean $\mu_U = \frac{a+b}{2}$ and variance $\sigma_U^2 = \frac{(b-a)^2}{12}$ (as proven by **??**).

We can select any a and b for a uniform distribution (as long as $b > a$), calculate the mean and variance, and then create a corresponding normal distribution. This is shown in Figure 1. The

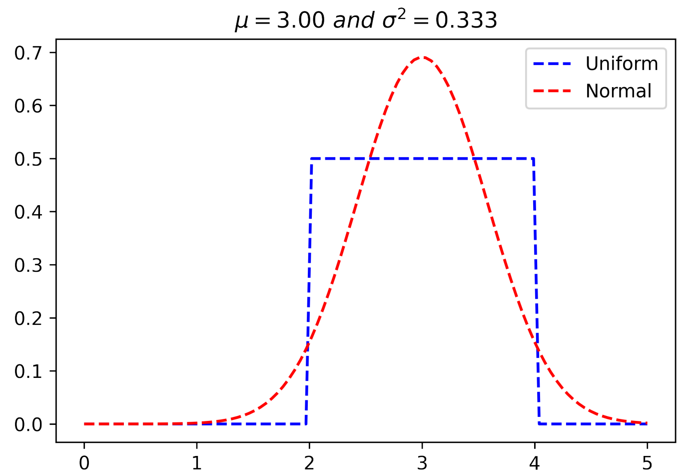

Figure 1: Normal and Uniform distribution having the same mean and variance
The blue line is for a uniform distribution with $a = 2$ and $b = 4$. The red line is for a normal distribution with $\mu = 3$ and $\sigma^2 = \frac{1}{3}$

code responsible for this figure is described in appendix **??**.