

My solutions to
Deep Learning: Foundations and Concepts

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14 Sampling

14.4

$$\begin{aligned} F(y) &:= \int_{-\infty}^y \frac{1}{\pi} \frac{1}{1 + \hat{y}^2} d\hat{y} \\ &= \frac{1}{\pi} [\arctan y]_{-\infty}^y \\ &= \frac{1}{\pi} \left(\arctan y - \left(-\frac{\pi}{2} \right) \right) \\ &= \frac{\arctan y}{\pi} + \frac{1}{2} \end{aligned}$$

with

$$F^{-1}(z) = \tan(\pi(z - 0.5)) : (0, 1) \longrightarrow \mathbb{R}$$

So $Y := F^{-1}(Z) = \tan(\pi(Z - 0.5)) \sim \text{Cauchy}(0, 1)$.