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proof of Markov's inequality

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Define

$$Y = \begin{cases} d & X \geq d \\ 0 & \text{otherwise} \end{cases}.$$

Then $0 \leq Y \leq X$. Additionally, it follows immediately from the definition that Y is a random variable (i.e., that it is measurable). Computing the expected value of Y , we have that

$$\mathbb{E}[X] \geq \mathbb{E}[Y] = d \cdot \mathbb{P}\{X \geq d\},$$

and the inequality follows.