

Untitled

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$$\begin{aligned} EX^2 &= \int_{-\infty}^{\infty} x^2 f_X(x) dx \\ &\geq \int_{-\infty}^{-a} x^2 f_X(x) dx + \int_a^{\infty} x^2 f_X(x) dx \\ &\geq \int_{-\infty}^{-a} a^2 f_X(x) dx + \int_a^{\infty} a^2 f_X(x) dx \end{aligned}$$

Because $a \leq |X|$, so $a^2 \leq x^2$

$$\begin{aligned} &\geq a^2 \left(\int_{-\infty}^{-a} f_X(x) dx + \int_a^{\infty} f_X(x) dx \right) \\ &\geq a^2 P(|X| \geq a) \end{aligned}$$

$$EX^2 \geq a^2 P(|X| \geq a)$$