W203, Unit 3 Proof

Artem Lebedev

September 11, 2022

1. Correlation between X and $aX + b$

$$Corr[aX + b, X] = \frac{Cov[aX + b, X]}{\sqrt{Var[aX + b]} * \sqrt{Var[X]}}$$

$$\frac{a * Cov[X, X]}{|a| * \sqrt{Var[X]} * \sqrt{Var[X]}} =$$

$$\frac{a}{|a|} * Corr[X, X] = \frac{a}{|a|} =$$

$$\begin{cases} 1, a > 0 \\ -1, a < 0 \end{cases}$$

2. Heavy Tails