Reminder II

- For $X : \Omega \to \mathbb{R}$, Variance, standard deviation, n^{th} moment, moment generating function.
- Indicator function $\mathbb{1}_A$: $\mathbb{P}(X \in A) = \mathbb{E}(\mathbb{1}_A(X))$
- Gaussian + some inequalities
- For $X^j : \Omega \to \Lambda^j$, joint prob. measure for $Z = (X^1, X^2) : \Omega \to \Lambda^1 \times \Lambda^2$, equipped with $\mathcal{E}^1 \times \mathcal{E}^2$.
- $Cov(X^1, X^2)$, $Cov(X)$, $Corr(X_1, X_2)$.
- For $X = (X_1, \dots, X_N)$, $\mathbb{E}(a \cdot X) = a \cdot \mathbb{E}(X)$,
  $Var(a \cdot X) = a^T Cov(X)\, a$. no condition on X
- Independence : $\mu_{(X^1, X^2)} = \mu_{X^1} \mu_{X^2}$
- IID : $X^1, \dots, X^N$ are all independent and have the same induced measure. : $\mu_{(X^1, \dots X^N)} = \prod_{j=1}^{N} \mu_{X^j}$.
- $L^p(\Omega, \mathcal{F}, \mathbb{P})$, normed vector space $L^{p_2} \subset L^{p_1}$ if $p_2 > p_1$
  and $\forall\, X, Y \in L^2(\Omega, \mathcal{F}, \mathbb{P})$, $|\mathbb{E}(XY)| \leq \|X\|_2 \|Y\|_2$