

# Probability & Statistics.

L-16

[ Correlation coefficient  
Conditional density for cont. RV  
pdf of a function of a cont. RV  
pdf of a function of a pair of cont. RV.

Expected value & variation need not determine the pdf of a RV.

Q. What do is the use of  $E(x)$  &  $V(x)$  for a given  $X$ . What information be acquired knowing these values.

Ans.  $E(x)$  &  $V(x)$  can be used to determine bounds for ~~some~~ probability of some events!

## Markov Inequality.

If  $X$  is a random variable that takes only non-negative values then for any  $a > 0$

$$P(\{X \geq a\}) \leq \frac{E(X)}{a}.$$

Pf. Let us prove for continuous

R.V.

$$E(X) = \int_0^{\infty} x p_X(x) dx$$

$$= \int_0^a x p(x) dx + \int_a^{\infty} x p(x) dx$$

$$\geq \int_a^{\infty} x p(x) dx$$

$$\geq \int_a^{\infty} a p(x) dx$$

$$= a \int_a^{\infty} p(x) dx$$

$$= a P(X \geq a)$$

$$\Rightarrow \boxed{P(X \geq a) \leq \frac{1}{a} E(X)}$$

