

## Example

- Let's say that  $X, Y$  are random variables, then

$$\mathbb{E}[(X + Y)^2] = \mathbb{E}[X^2 + 2XY + Y^2] = \mathbb{E}[X^2] + 2\mathbb{E}[XY] + \mathbb{E}[Y^2].$$

- (In general, we cannot go further and need to compute each of these three terms...)
- More specifically, we do not have  $\mathbb{E}[X^2] = \mathbb{E}[X]\mathbb{E}[X] = (\mathbb{E}[X])^2$  in general.