

Interesting Note from Tutorial

In tutorial someone asked a good question: how is it possible for Y_1, \dots, Y_n all not be identically distributed (not have the same distribution) but make the same mean and variance? Consider the following example:

$$Y_1 \sim N(\mu = 1, \sigma^2 = 1), \quad Y_2 \sim \text{Exp}(\beta = 1)$$

Clearly, $\mathbb{E}[Y_1] = \mu = 1$ and $\mathbb{V}[Y_1] = \sigma^2 = 1$. Similarly, $\mathbb{E}[Y_2] = \beta = 1$ and $\mathbb{V}[Y_2] = \beta^2 = 1$ (you can check these values through the formula sheet.) Hence, we see that the mean and variances are the same. However, it should be clear that these both have a different distribution.