

On Distributions

1. Let $X \sim \mathcal{N}(\mu, \sigma^2)$ then

$$Z = \frac{X - \mu}{\sigma} \sim \mathcal{N}(0, 1)$$

2. Let $X \sim \mathcal{N}(0, 1)$ then

$$X^2 \sim \chi^2(1)$$

χ^2 distributed with $df = 1$

3. Let X_1, X_2, \dots, X_n be independent standard normally distributed random variables, then

$$\sum_{i=1}^n X_i^2 \sim \chi^2(n)$$

4. Let $X \sim \mathcal{N}(0, 1)$ and $V \sim \chi^2(\nu)$, and X and V independent then

$$t = \frac{X}{\sqrt{V/\nu}} \sim t(\nu)$$

t-distributed with $df = \nu$

5. Let $V \sim \chi^2(\nu)$ and $W \sim \chi^2(\eta)$ and V and W independent, then

$$F = \frac{V/\nu}{W/\eta} \sim F(\nu, \eta)$$

F-distributed with ν and η degrees of freedom.