https://www.youtube.com/watch?v=JQc3yx0-Q9E&list=PLblh5JKOoLUK0FLuzwntyYI10UQFUhsY9&index=12&ab\_channel=StatQuestwithJoshStarmer

To get the probability of a number xx from a **normal distribution**, you typically use the **probability density function (PDF)** or the **cumulative distribution function (CDF)**.

**1. Probability Density Function (PDF)**

The **PDF** of a normal distribution is given by:

Where:

* μ\mu = Mean of the distribution
* σ\sigma = Standard deviation
* xx = The value you want to evaluate

This gives the relative likelihood of xx occurring but **not the actual probability** since the probability in a continuous distribution is calculated over an interval.

**Python Example (Using SciPy)**

from scipy.stats import norm

mu = 0 # Mean

sigma = 1 # Standard deviation

x = 1.5 # Value to evaluate

pdf\_value = norm.pdf(x, mu, sigma)

print(pdf\_value) # Probability density at x

**2. Cumulative Distribution Function (CDF) – this what you use to get the values for p-value**

The **CDF** gives the probability that a random variable XX is **less than or equal to** xx:

This is useful if you want to find the probability of **observing a value up to xx**.

**Python Example (Using SciPy)**

cdf\_value = norm.cdf(x, mu, sigma)

print(cdf\_value) # Probability P(X ≤ x)

To get the probability of a number lying in a specific range (a,b)(a, b):

a, b = -1, 1.5

probability = norm.cdf(b, mu, sigma) - norm.cdf(a, mu, sigma)

print(probability) # Probability of X being between -1 and 1.5

Let me know if you need further clarification! 😊