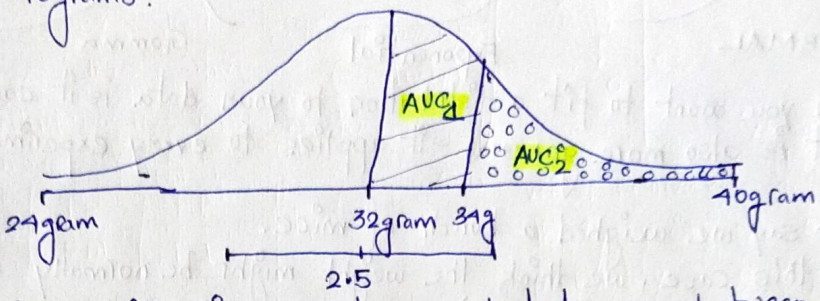
LIKELIHOOD VS PROBABILITY

PROBABILITY

Example → Let imagine a distribution of mouse weight.
- It has a mean of 32 grams and a standard deviation of 2.5
- On low end (lowest weight) is 24grams. and high end (highest weight) is 40grams.



The probability that we will weigh a randomly selected mouse between 32g and 34g
→ Area under the Curve (AUC_1) between 32g to 34gram. AUC_1

In this case, the area under the curve = 0.29, meaning there's a 29% chance a randomly selected mouse will weigh between 32 and 34.

Mathematically, $P(\text{weight between 32 \& 34g} \mid \text{mean} = 32 \text{ and } SD = 2.5) = 0.29$.

Another example, if we wanted to know the probability of a mouse weight more than 34g

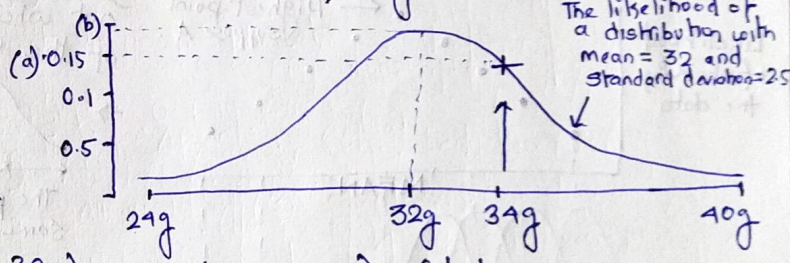
$P(\text{mouse weight} > 34g \mid \text{mean} = 32 \text{ and } SD = 2.5) = AUC_2$

LIKELIHOOD

To talk about likelihood, we assume that we have already weighed our mouse (or mice, if we weighed more than once)

Suppose it weighs 34gram.

$L(\text{mean} = 32 \text{ \& } SD = 2.5 \mid \text{mouse weigh} = 34g) = 0.15$ point a



Another example.

$L(\text{mean} = 32 \text{ \& } SD = 2.5 \mid \text{mouse weigh} = 32g) = 0.21$ (suppose ans) point b.

In likelihood, measurement of right side are fixed. and we modify the shape and location of the distribution with the left side.

In probability, measurement of right side is also fixed and we change the left part of equation if we are interested in different mouse weight.

In summary, probabilities are the areas under a fixed distribution. i.e, pr(data | distribution)

Likelihood are the y axis values for fixed data points with distribution than can be moved. i.e, L(distribution | data)