Stats

Contents

Probability Distributions

Binomial

The binomial distribution is used to model a situation with a fixed number of independent trials each with a constant probability of success.

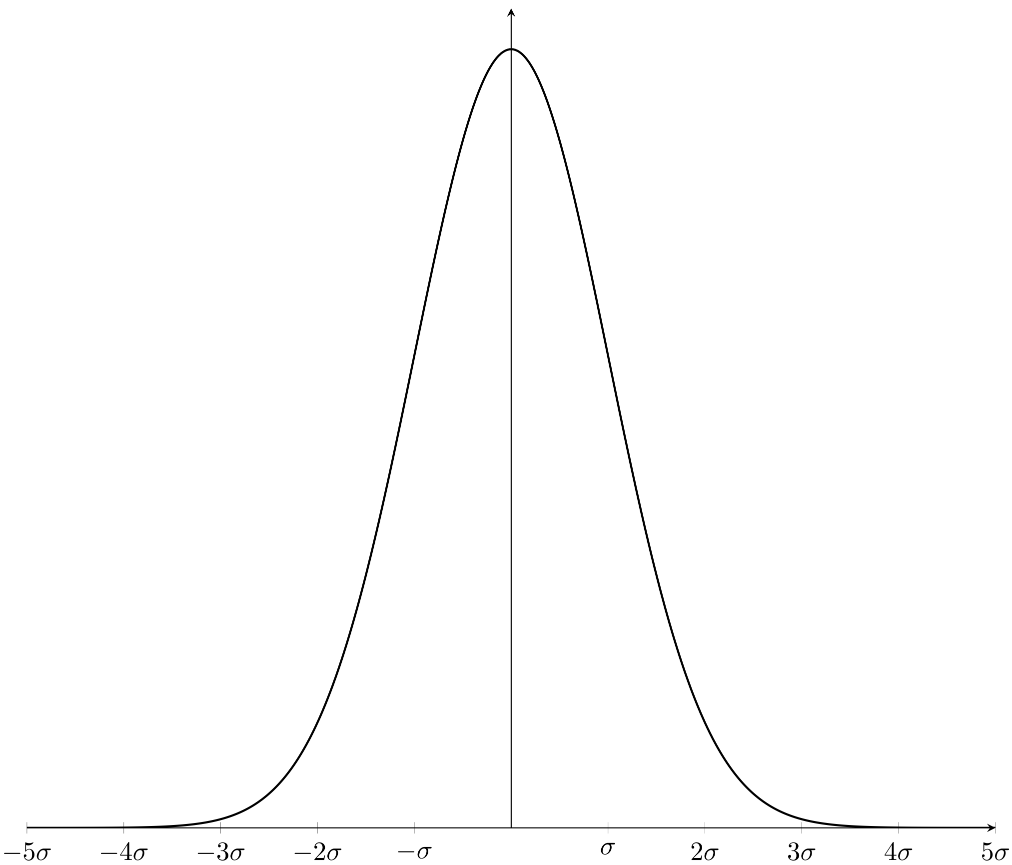
You can model X as a binomial distribution if:

- There a fixed number of trials, n
- Each trial must succeed or fail
- There is a fixed probability of success, p
- Each trial is independent

$$\text{If } X \sim \mathrm{B}(n,p)\text{, then } \boxed{P(X=x) = \binom{n}{x} p^x (1-p)^{n-x}} \quad (0 \leq x \leq n)$$

Normal

The normal distribution $X \sim \mathrm{N}(\mu, \sigma^2)$ is symmetrical, meaning the mean and median are equal.



Hypothesis Testing

Every hypothesis test has two hypotheses:

$$H_0 : \text{The null hypothesis - this is what you assume to be true by default}$$
$$H_1 : \text{The alternative hypothesis}$$

The hypotheses are written in different forms depending on whether the test is one- or two-tailed.

<u>One-tailed:</u>

$$H_0 : p = k$$
$$H_1 : p \lesseqgtr k$$

<u>Two-tailed:</u>

$$H_0 : p = k$$
$$H_1 : p \neq k$$

If the question says that someone measured and got a value, then you plug that value into a probability calculation with the parameters from the null hypothesis, with the inequality sign in the same direction as the alternative hypothesis. If the probability of the event happening when assuming H_0 is less than the level of significance, then we reject H_0 and accept the alternative hypothesis.

A critical value is the smallest or largest value (depending on the direction of the inequality) obtained by a random variable such that H_0 would be rejected. Finding a critical value is often best done with the tables in the back of the book.