A/B testing	https://www.interviewquery.com/learning-paths/statistics-and-ab-testing/ab-testing-&-experiment-design/before-testing	
Hypothesis testing	1. One-tailed and two-tailed tests 2. ANOVA 3. z- test 4. t- test	Null Hypothesis: H_0: μ=μ0 (two-sided), μ≥μ0, μ≤μ0 (one-sided) Alternative Hypothesis: H_a : μ!=μ0 (two-sided), μ<μ0 , μ>μ0(one-sided)
Z-Test	When sample size is large compares mean (u) of the sample to some value Uses population standard deviation (σ)	They both assume the samples from the population follow a normal distribution They both have the same null and alternative hypothesis They both use the same test statistic, namely (μ−μ0)/(s/ n) where s is the sample standard deviation and n is the sample size.
	Description: Tests if the mean μ is equal/less than/ greater than μ0 **Statistic**: μ (mean) **Distribution**: N(μ,square of (σ)) (normal) z = $\frac{u-u_0}{s\sqrt{n}}$ (s=σ if known)	
T- test	When Sample size is small Uses sample's standard deviation (s)	The only difference between them is that they use a different probability distribution function (pdf) (and thus, cumulative distribution function) to calculate their p-value. The pdf used the **Z test is the pdf of the standard normal distribution.** Whereas the **t uses the pdf of the t-distribution**
	Description: Tests if the mean μ is equal/less than/ greater than μ0 for small sample (n<=30) **Statistic**: μ (mean) **Distribution**: T(n-1)(t) T= $\frac{\hat{u}-u_0}{s\sqrt{n}}$ s= σ if known	
	Independent Two-sample t-test With **Equal Variances and Sample Sizes:** **Description:** Tests if the mean of one sample (μ1) is different/less than/more than the mean of another sample (μ2) when the samples have equal sample size, variance, and are independent **Statistic**: μ1−μ2 (mean) **Distribution:** T(2n−2) (t) $\tau = \frac{\hat{u}_1-\hat{u}_2}{\sqrt{S_1^2+S_2^2}}$	
	Independent Two-sample t-test With **Equal Variances and Unequal Sample Sizes** **Description**: Tests if the mean of one sample (μ1) with n1 data points is different/less than/more than the mean of another sample (μ2) with n2 data points when the samples have equal variances and are independent **Statistic**: μ1−μ2(mean) **Distribution**: T(n1 + n2−2) (t) $T = \frac{u_1^2-u_2^2}{\sqrt{\frac{(n_,-1)\,S_1^2+\left(n_2^2-1\right)s_2^2}{(n_1+n_2-2)}}\sqrt{\frac{n_1+n_2}{n_1 n_2}}}$	
	Dependent Two-sample t-test **Description**: Tests if the mean of one sample (μ1) with n1 data points is different/less than/more than the mean of another sample (μ2) with n2 data points when the samples have unequal variances and are independent **Statistic**: μ1−μ2 (mean) **Distribution**: T(df) (t) where $df = \frac{\left(\frac{s_1^2}{n_1}+\frac{s_2^2}{n_2}\right)^2}{\left(\frac{s_1^2}{n_1}\right)^2 + \left(\frac{s_2^2}{n_2}\right)^2}$ **Test Statistic**: $T = \frac{\hat{u}_1-\hat{u}_2}{\sqrt{\frac{S_1^2}{n_1}+\frac{S_2^2}{n_2}}}$	
	Paired (Dependent) t-test **Description**: Tests if the ***difference of the same sample before and after some treatment*** is equal/less than/more than some number μ0 **Statistic**: μΔ (mean of differences between pairs) **Distribution**: T(n−1) (t)	
Proportion Testing	Works for categorical data i.e. Binomial Distribution e.g: (% voters that vote for candidate A, % of people who prefer coffee to tea, % of images correctly classified by a machine learning model)	
	One sample Test Proportion **Description**: Tests if a proportion of a sample (p) is equal to or less than or more than some p0 ∈(0,1) **Statistic**: p (proportion) **Distribution**: B(n,p0) (Binomial) z = (p−p0)/ sqrt(p0(1-p0)/n) p= no of success observations/n	
	Two Sample Test of Proportions **Description**: Tests if a proportion of a sample (p1) is equal to/less than/ more than a proportion of another sample (p2) **Statistic**: p1 −p2 (difference of proportion) **Distribution**: Literally B(n1 ,p1)−B(n2,p2) (Difference of Binomials), but practically N(p1−p2,v) (Normal Approximation) z= (p1-p2)/ sqrt(v(1-v)(1/n1 + 1/n2)) v= Number of oberservations in the success class across BOTH samples / (n1+n2)	
ANOVA (**AN**alysis **O**f **VA**riance)		
P-Value	<0.05 --> lesser the better	
Type 1/ Type 2 errors	Type1: Reject H0 when H0 is True Type2: H0 not rejected when H0 is False	
Large sample proportion hypothesis testing		
A/B testing Interview prep	https://towardsdatascience.com/7-a-b-testing-questions-and-answers-in-data-science-interviews-eee6428a8b63	

A/B Testing Experiment Design	1. Choose and characterize metrics to evaluate your experiments. What do you care about? How do you want to measure the effect? 2. Choose the significance level, power, the length of the test, and calculate the required sample size. 3. Implement the A/B test with control/treatment groups and run the test. 4. Analyze the results and draw valid conclusions