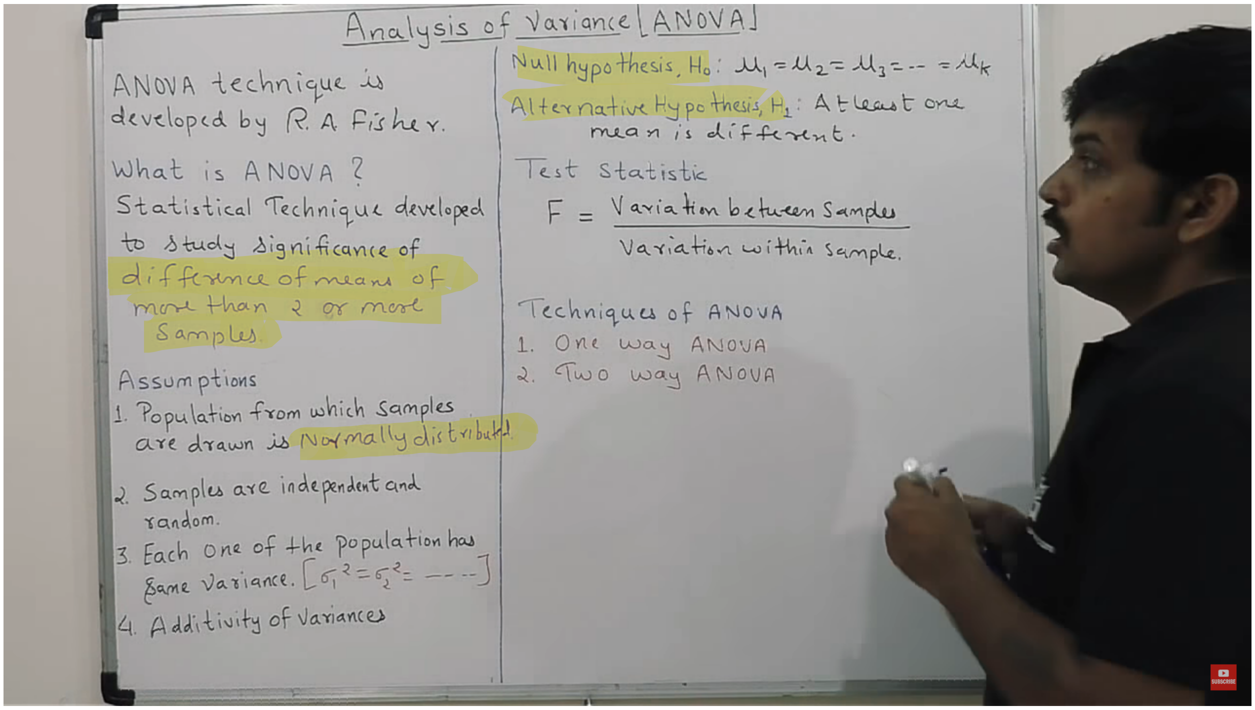
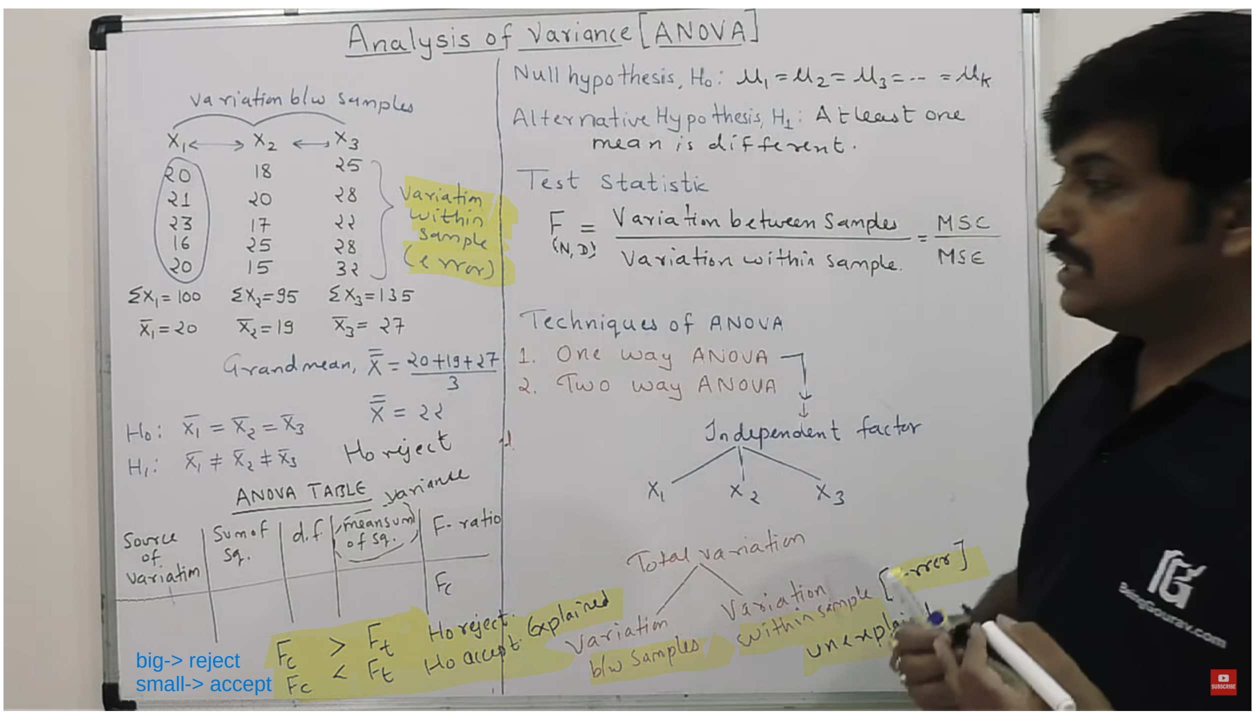
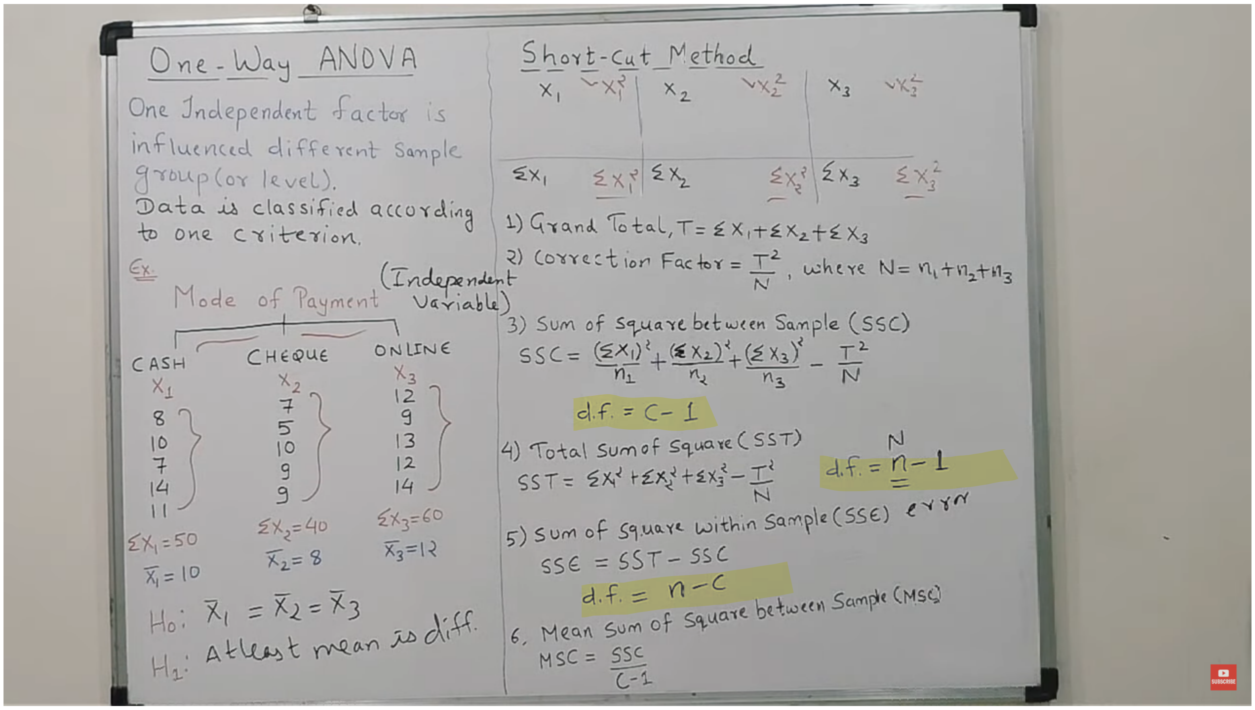
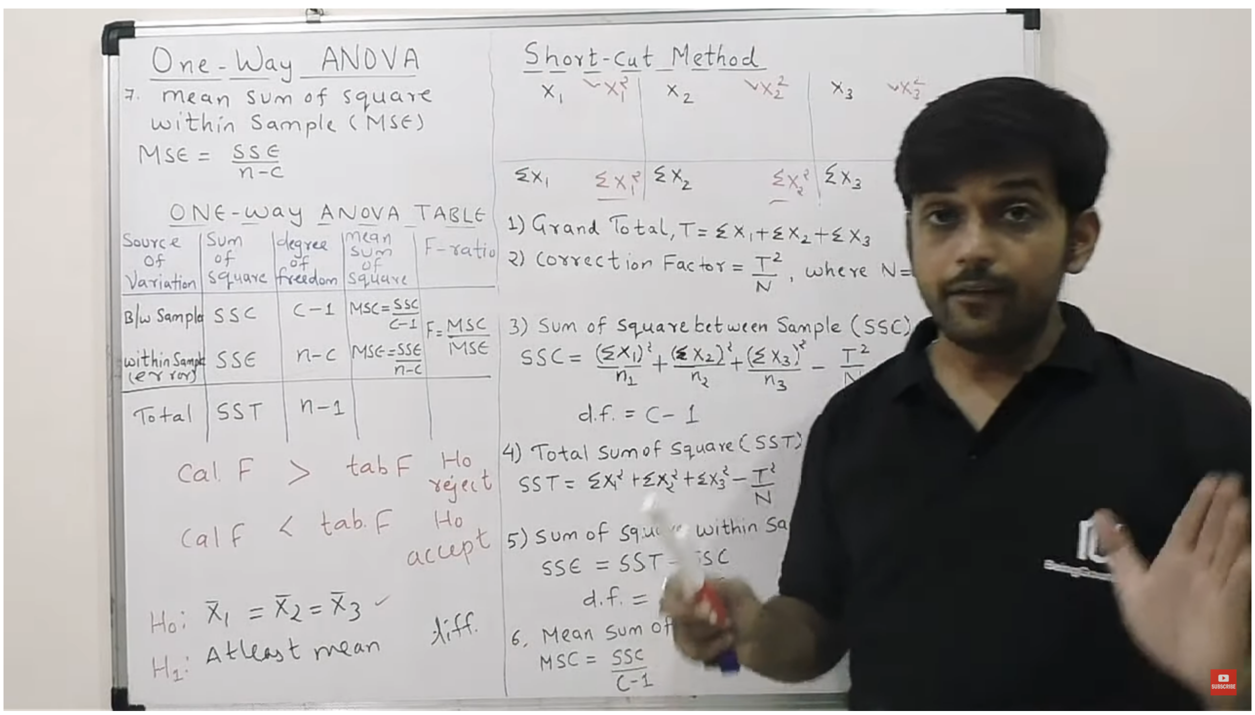

Analysis of Variance [ANOVA]
ANOVA technique is developed by R. A Fisher.
What is ANOVA ?
Statistical Technique developed to study significance of difference of means of more than 2 or more samples.
Assumptions
1. Population from which samples are drawn is Normally distributed.
2. Samples are independent and random.
3. Each one of the population has same variance. [σ1² = σ2² = ----]
4. Additivity of Variances
Null hypothesis, H0 : μ1 = μ2 = μ3 = -- = μk
Alternative Hypothesis, H1 : At least one mean is different.
Test Statistic
F = Variation between Samples / Variation within sample.
Techniques of ANOVA
1. One way ANOVA
2. Two way ANOVA


Analysis of Variance [ANOVA]
variation b/w samples
X1 X2 X3
20 18 25
21 20 28
23 17 22
16 25 28
20 15 32
Variation within sample (error)
ΣX1 = 100 ΣX2 = 95 ΣX3 = 135
X̄1 = 20 X̄2 = 19 X̄3 = 27
Grand mean, X̿ = (20+19+27)/3
X̿ = 22
H0 : X̄1 = X̄2 = X̄3
H1 : X̄1 ≠ X̄2 ≠ X̄3
H0 reject
ANOVA TABLE
Source of Variation
Sum of Sq.
d.f
Mean sum of sq.
variance
F- ratio
Fc
big-> reject
small-> accept
Fc > Ft H0 reject
Fc < Ft H0 accept
Explained
Null hypothesis, H0 : μ1 = μ2 = μ3 = -- = μk
Alternative Hypothesis, H1 : At least one mean is different.
Test Statistic
F(N, D) = Variation between Samples / Variation within sample. = MSC / MSE
Techniques of ANOVA
1. One way ANOVA
2. Two way ANOVA
Independent factor
X1 X2 X3
Total variation
Variation b/w Samples
Variation within sample [error]
unexplained

One-way ANOVA





Two-way ANOVA