ANOVA
Statistics

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Seminar Overview

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Coffee packing machine has precision of $\sigma = 3$. Amount of coffee in the pack is normal random variable with distribution $\mathcal{N}\left(\mu, \sigma^2\right)$. Engineer is going to test $H_0 : \mu = \mu_0 = 100$ against alternative $H_1 : \mu = \mu_1 = 101$. From economic reasoning she would like to have probability of Type I error α equal to 0.025, and probability of Type II error β equal to 0.05. The rejection region is $\overline{x} > k$. ($\overline{x}$ is mean amount of coffee in n arbitrary chosen cans).

① Find sample size n which guarantees the chosen probabilities.
② What is (approximately) threshold k for the chosen test?

One-way ANOVA

One-way ANOVA

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One-way ANOVA

A manufacturer of diet soda is considering three alternative can colors – red, yellow, and blue. To check whether such considerations have any effect on sales, sixteen stores of approximately equal size are chosen. Red cans are sent to six of these stores, yellow cans to five others, and blue cans to the remaining five. The results (in tens of cans) shown in the table were obtained.

RED	43	52	59	76	61	81
YELLOW	52	37	38	64	74	
BLUE	61	29	38	53	79	

1. Calculate the within groups, between groups, and total sums of squares.
2. Complete the analysis of variance table, and test the null hypothesis that the population mean sales levels are the same for all three can colors.

Problem 1

Problem 1

Two-way ANOVA

Two-way ANOVA

Problem 2

An agricultural experiment designed to assess differences in yields of corn for four different varieties, using three different fertilizers, produced results (in bushels per acre) shown in the table.

Fertilizer	Variety			
	A	B	C	D
1	86	88	77	84
2	92	91	81	93
3	75	80	83	79

1. Set out the two-way analysis of variance table.
2. Test the null hypothesis that the population mean yields are identical for all four varieties of corn.
3. Test the null hypothesis that the population mean yields are identical for all three brands of fertilizer.

Problem 2

Problem 2

Problem 3

Independent random samples of six assistant professors, fours associate professors, and five full professors were asked to estimate the amount of time outside the classroom spent on teaching responsibilities in the last week. Results, in hours, are shown in the accompanying table.

ASSISTANT	ASSOCIATE	FULL
7	15	11
12	12	7
11	15	6
15	8	9
9		7
14		

1. Set out the analysis of variance table.
2. Test the null hypothesis that the three population mean times are equal.

Problem 3

Problem 3

Look at the time!