

Math 263
Quiz 12 Spring 2014

Name _____

The sound quality of four recording methods, A, B, C, D, are compared using ANOVA, with the results in the table.

	Sum of squares	Degrees freedom	Mean Squares	<i>F</i>
Between groups	68			
Within groups		18		
Total	162			

- (a) Fill in the missing entries in the table.
- (b) What are H_0 and H_a ?

- (c) What is the distribution of the statistic?

- (d) What is its P -value?

- (e) What is the interpretation of the P -value in terms of recordings?

- (f) What is your conclusion about the recording methods?

Solutions

(a)

	Sum of squares	Degrees freedom	Mean Squares	F
Between groups	68	3	$68/3 = 22.67$	$\frac{22.67}{5.22} = 4.34$
Within groups	94	18	$94/18 = 5.22$	
Total	162	21		

- (b) H_0 is that all the means are equal: $\mu_1 = \mu_2 = \mu_3 = \mu_4$.
 H_a is that the means are not all equal; there are differences between at least some of the μ values.
- (c) Distribution is F with (3,18) degrees of freedom.
- (d) From the table, we see the P -value of $F = 4.34$ is between 0.01 (critical value = 5.09) and 0.025 (critical value = 3.95).
From the calculator
$$P = P(F > 4.34) = Fcdf(4.34, 50, 3, 18) = 0.018.$$
- (e) The P -value is the probability that if the sound quality of all the methods is the same that we see sample means as far as apart as we do by chance.
- (f) We reject the null hypothesis; there is a difference between recording methods at the 5% level of significance.