

9.8: Chapter 9 Solutions

3. $SS_{Factor} = 4,939.2$

5. $df_{num} = 2$

7. $MS_{Factor} = 2,469.6$

9. $F_{obs} = 3.742$

11. $F_{\alpha=.05,2,12} = 3.89$. F_{obs} does not exceed $F_{critical}$, so we fail to reject H_0 .

13. $H_0: \mu_1 = \mu_2 = \mu_3 = \mu_4$; H_a : At least two of the means ($\mu_1, \mu_2, \mu_3, \mu_4$) are not equal.

15. $df_{num} = 3$

17. $SS_{Within} = 13.2$

19. $MS_{Within} = .825$

21.

Source of variation	SS	df	MS	F
Between	25.75	3	8.583	10.404
Within	13.2	16	.825	
Total	38.95	19		

Table 9.8.1

23. The closest available F -value to our $F_{obs} = 10.404$ at (3, 16) df is 9.01, which corresponds to α of .01. Therefore, the p -value must be less than .01. Because this p -value is less than $\alpha = .05$, we reject H_0 .

27. $df_{num} = 4$

29. $SS_{Factor} = 195.6$; $MS_{Factor} = 48.9$

31. $F_{obs} = 2.060$

33. $F_{\alpha=.05,4,10} = 3.48$

35. No, F_{obs} does not exceed $F_{critical}$, and the approximate p -value exceeds α , so we fail to reject H_0 .

37. $df_{num} = 2$

39. $SS_{Between} = 5,700.4$; $MS_{Between} = 2,850.2$

41. $F_{obs} = 3.610$

43. $F_{\alpha=.01,2,12} = 6.93$

45. No, F_{obs} does not exceed $F_{critical}$, and the approximate p -value exceeds α , so we fail to reject H_0 .

47. $SS_{Between} = .903$

49. $df_{num} = 4$

51. $F_{obs} = 4.220$

53.

a. Decision: Reject H_0 , because the approximate p -value (between .01 and .05) is less than α .

b. Conclusion: There is a significant difference in at least one of these regions of the country for the average age at which teenagers obtain their driver's licenses.

55. $H_0: \mu_{East} = \mu_{Central} = \mu_{West}$; H_a : At least two of the means ($\mu_{East}, \mu_{Central}, \mu_{West}$) are not equal.

$$F_{obs} = \frac{\frac{344.164}{2}}{\frac{1,219.550}{11}} = \frac{172.082}{110.868} = 1.552$$

$$F_{\alpha=.05,2,12} = 3.98$$

F_{obs} does not exceed $F_{critical}$, so we fail to reject H_0 .

57. $H_0 : \mu_{Linda} = \mu_{Tuan} = \mu_{Javier}$; H_a : At least two of the means ($\mu_{Linda}, \mu_{Tuan}, \mu_{Javier}$) are not equal.

$$F_{obs} = \frac{\frac{23.212}{2}}{\frac{208.324}{12}} = \frac{11.606}{17.360} = .669$$

$$F_{\alpha=.01,2,12} = 6.93$$

F_{obs} does not exceed $F_{critical}$, so we fail to reject H_0 .

59. $H_0 : \mu_{Home} = \mu_{News} = \mu_{Health} = \mu_{Computer}$; H_a : At least two of the means ($\mu_{Home}, \mu_{News}, \mu_{Health}, \mu_{Computers}$) are not equal.

Source of variation	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>
Between	34,288.6	3	11,429.533	8.689
Within	21,047.6	16	1,315.475	
Total	55,336.2	19		

Table 9.8.2

$F_{\alpha=.05,3,16} = 3.24$. F_{obs} does exceed $F_{critical}$, so we can reject H_0 .

61. $H_0 : \mu_{CNN} = \mu_{FOX} = \mu_{Local}$; H_a : At least two of the means ($\mu_{CNN}, \mu_{FOX}, \mu_{Local}$) are not equal.

$$F_{obs} = \frac{\frac{1,967.925}{2}}{\frac{3,375.133}{14}} = \frac{983.963}{241.081} = 4.081$$

$$F_{\alpha=.05,2,14} = 3.74$$

F_{obs} exceeds $F_{critical}$, so we reject H_0 .

63. $H_0 : \mu_{White} = \mu_{Black} = \mu_{Hispanic} = \mu_{Asian}$; H_a : At least two of the means ($\mu_{White}, \mu_{Black}, \mu_{Hispanic}, \mu_{Asian}$) are not equal.

Source of variation	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>
Between	13.032	3	4.344	.885
Within	73.600	15	4.907	
Total	86.632	18		

Table 9.8.3

$F_{\alpha=.01,3,15} = 5.42$. F_{obs} doesn't exceed $F_{critical}$, so we cannot reject H_0 .

65.

1. Yes.

2. Because $n_1 = n_2 = n_3$.

3. $\bar{x}_{Heavy} = 4.55, s_{Heavy} = 1.00; \bar{x}_{Medium} = 4.525, s_{Medium} = 1.13; \bar{x}_{Light} = 2.60, s_{Light} = .70$

4. $g = 3$

$n = 12$

$SS_{Between} = 10.012$

$MS_{Between} = 5.006$

$SS_{Within} = 8.277$

$MS_{Within} = .920$

$df_{num} = 2, df_{denom} = 9$

- F statistic = 5.443
 - F -critical = 8.02
 - Graph: Check student's solution.
 - Decision: F_{obs} doesn't exceed $F_{critical}$, so we cannot reject H_0 .
 - Conclusion: There is not sufficient evidence to conclude that the mean paper airplane flight distances differ based on paper weights.
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