

ANSWERS TO SELECTED TEXTBOOK PROBLEMS

The answers to most end-of-chapter problems are given in the text in Appendix C. However, I have withheld answers to at least one problem in each chapter, due to requests from professors. The answers to these problems are given below.

Chapter 1

- 6. **a.** (1) fear of smoking (2) number of cigarettes smoked (3) the 40 smoking adults who participated in the experiment (4) all smoking adults residing in the city where the psychologist works at the time of the experiment (5) the number of cigarettes smoked daily by each member of the sample during the 2-month post-film period (6) the mean number of cigarettes smoked daily by each group.
- 9. **b.** The sample scores are the 15 weights given. The population scores are the 450 weights that would result if all the hamburgers served on that day were measured.

Chapter 2

- 5. **c.** 148
- 6. **b.** 25.26
- 7. **c.** 95-105
- 8. **c.** 58
- 13. **c.** 52

Chapter 3

- 8. **b.** 19.74
- 12. **b.** 17.16

15a. Class Interval	f
3.6-3.8	3
3.3-3.5	12
3.0-3.2	14
2.7-2.9	10
2.4-2.6	7
2.1-2.3	6
1.8-2.0	5
1.5-1.7	3
1.2-1.4	3
0.9-1.1	1
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Chapter 4

16. b. $\bar{X} = 22.75$, Mdn = 24.5, mode = 30

27. b. range = 24, $s = 10.76$, $s^2 = 115.70$

28. 92.20

Chapter 5

14. a. 89.44% b. 8.38% c. 80.18% d. 26.84% e. 123.12

Chapter 6

15. b. $r = 0.63$ c. Not very well. It only accounts for 39.63% of the variability of the Exam 1 scores.

Chapter 7

9. b. $Y' = 0.316X - 0.015$ d. 3.77

Chapter 8

14. a. 0.0278 b. 0.0556 c. 0.5556 d. 0.1667

24. a. 0.0084 b. 0.1334 c. 0.7422

Chapter 9

9. a. 0.2312 b. 0.3186 c. 0.2184

13. 0.0006

Chapter 10

9. **a.** The alternative hypothesis states that rhesus monkeys have a preference for either novel stimulation or repetitive stimulation. **b.** The null hypothesis states that in rhesus monkeys there is no difference in preference between novel and repetitive stimulation. **c.** $p(0, 1, 2, 10, 11, \text{ or } 12 \text{ pluses}) = 0.0384$. Since $0.0384 < 0.05$, you can reject H_0 . Rhesus monkeys appear to prefer novel stimulation. **d.** You may be making a Type I error, rejecting H_0 if it is true. **e.** The results apply to the rhesus monkeys housed in the university colony at the time of the experiment.

Chapter 11

7. Power = 0.2969, beta = 0.7031

Chapter 12

21. **a.** The alternative hypothesis states that the student's technique affects the duration that schizophrenics spend in an institution. **b.** The null hypothesis states the student's technique has no effect on the duration that schizophrenics spend in an institution. **c.** $z_{\text{obt}} = -2.09$, and $z_{\text{crit}} = \pm 1.96$. Since $|z_{\text{obt}}| > 1.96$, you reject H_0 and accept H_1 . The student's technique appears to shorten the duration of stay.

Chapter 13

14. **b.** 117.01-122.99 (95%) ; 115.97-124.03 (99%)
 16. **a.** The alternative hypothesis states that the effectiveness of training in mathematics at the private high school differs from that of the public high schools. **b.** The null hypothesis states that the private high school and the public high schools are equal in the effectiveness of the mathematics training they provide. **c.** $t_{\text{obt}} = 2.62$, and $t_{\text{crit}} = \pm 2.021$. Since $|t_{\text{obt}}| > 2.021$, you reject H_0 and conclude that the effectiveness of training in mathematics at the private high school does differ from that of the public high schools. It appears to be better.

Chapter 14

14. **a.** The alternative hypothesis states that the experimental birth control pill affects blood pressure, $\mu_D \neq 0$. **b.** The null hypothesis states that the birth control pill has no effect on blood pressure, $\mu_D = 0$. **c.** $t_{\text{obt}} = 1.52$, and $t_{\text{crit}} = \pm 3.250$. Since $|t_{\text{obt}}| < 3.250$, you retain H_0 . The data are insufficient to allow you to conclude that the birth control pill affects blood pressure.
 16. **a.** $t_{\text{obt}} = 4.00$, and $t_{\text{crit}} = 2.602$. You reject H_0 and conclude that the level of lead in the blood of children living near the smelter is significantly higher than that of

children living in an area relatively free from possible lead pollution. **b.** $\hat{d} = 1.97$. Using Cohen's criteria, the effect is a large one.

Chapter 15

21. a.

Source	SS	df	MS	F_{obt}
Between	1962.133	2	981.066	14.06
Within	837.200	12	69.767	
Total	2799.333	14		

$F_{\text{crit}} = 3.88$. Since $F_{\text{obt}} > 3.88$, we reject H_0 and conclude that sleep deprivation has an effect on the ability to maintain sustained attention.

d. $\hat{\omega}^2 = 0.635$, accounting for 63.5% of the variability.

e. $\eta^2 = 0.701$, accounting for 70.1% of the variability.

g. *Planned Comparisons.* $t_{\text{obt}} = 5.30$, and $t_{\text{crit}} = \pm 2.179$. Reject H_0 and conclude that 48 hours of sleep deprivation significantly affects the ability to maintain sustained attention. It appears to decrease this ability.

h. HSD

Condition	Sleep Deprivation		
	48 hr	24 hr	Normal Sleep
\bar{X}	48.6	61.8	76.6
$\bar{X}_i - \bar{X}_j$		14.8	28.0
			13.2
Q_{obt}		3.96	7.50
			3.53
$Q_{\text{crit}} = 3.77$			

Reject H_0 for normal sleep compared with 24-hour and 48-hour sleep deprivation. Retain H_0 with regard to the 24-hour and 48-hour sleep deprivation comparison. Twenty-four- and 48-hour sleep deprivation significantly interferes with the ability to maintain sustained attention.

i. Scheffé

Groups	$SS_{between}$ (groups i and j)	$df_{between}$ from ANOVA	$MS_{between}$ (groups i and j)	MS_{within} from ANOVA	$F_{Scheffé}$	F_{crit} from ANOVA	Conclusion
<i>N. Sleep and 24 hr</i>	547.600	2	273.800	69.767	3.925	3.88	Reject H_0
<i>N. Sleep and 48 hr</i>	1960.000	2	980.000	69.767	14.047	3.88	Reject H_0
<i>24 hr and 48 hr</i>	435.6000.	2	217.800	69.767	3.122	3.88	Retain H_0

Same conclusion as in part **h**.

Chapter 16

- 12. a.** There is no difference in the effect of the two fertilizers. $\mu_{a_1} = \mu_{a_2}$. There is no difference in the density of the three grasses. $\mu_{b_1} = \mu_{b_2} = \mu_{b_3}$. There is no interaction between the type of fertilizer and the type of grass. With any main effects removed, $\mu_{a_1b_1} = \mu_{a_1b_2} = \mu_{a_1b_3} = \mu_{a_2b_1} = \mu_{a_2b_2} = \mu_{a_2b_3}$. **b.**

Source	SS	df	MS	F_{obt}	F_{crit}
Rows (type of fertilizer)	177.633	1	177.633	17.05	4.26
Columns (type of grass)	176.867	2	88.433	8.49	3.40
Interaction	2.467	2	1.233	0.12	3.40
Within-cells	250.000	24	10.417		
Total	606.967	29			

Since $F_{obt} > F_{crit}$ for both the row and column main effects, H_0 is rejected. There is a significant main effect for the type of fertilizer and the type of grass. The interaction was not significant ($F_{obt} < F_{crit}$). It is apparent from the pattern of cell means that type 1 fertilizer was superior to type 2 fertilizer. The pattern of cell means also shows that Green Velvet grass was superior to the other two types. Therefore, on the basis of this experiment, you recommend Green Velvet grass and type 1 fertilizer. (You also receive a bonus for such a nicely conducted experiment.)

Chapter 17

- 18.** $\chi^2_{\text{obt}} = 18.00$, and $\chi^2_{\text{crit}} = 9.210$. Since $\chi^2_{\text{obt}} > 9.210$, we reject H_0 . There is a relationship between these occupations and attitudes toward wage and price controls. Labor appears to be for the controls, business against the controls, and the professions fairly evenly divided.
- 29. a.** The alternative hypothesis states that there is a difference in the degree of political conservatism of university theology and psychology professors. **b.** The null hypothesis states that university theology and psychology professors have the same degree of political conservatism. **c.** $U_{\text{obt}} = 19$, $U'_{\text{obt}} = 77$. Since $U_{\text{obt}} < 22$, you reject H_0 and conclude that theology and psychology professors differ in political conservatism. The theology professors appear to be more conservative.

Chapter 18

- 13. a.** $z_{\text{obt}} = -1.11$. Since $z_{\text{crit}} = -1.645$, we must retain H_0 . We cannot conclude that this year's freshmen have a lower daily fat intake level. **b.** Power = 0.5793 **c.** Power = 0.8315. **d.** $N = 38$ (rounded to nearest integer).