Problems

1. $\sum X_1 = 66,\ \sum X_2 = 45,\ \sum X_3 = 30,\ \sum X_4 = 70,\ \sum X = 211$

$\sum X_2^1 = 558,\ \sum X_2^2 = 279,\ \sum X_3^2 = 138,\ \sum X_4^2 = 620,\ \sum X^2 = 1{,}595$

$N_1 = 8,\ N_2 = 8,\ N_3 = 8,\ N_4 = 8,\ \mathrm{N} = 32$

$SS_{\mathrm{tot}} = 203.72$

$SS_{\mathrm{w}} = 72.38$

$SS_{\mathrm{b}} = 131.34$

ANOVA Summary Table

Source	*SS*	*df*	*MS*	*F*
Between groups	131.34	3	43.78	16.94
Within groups	72.38	28	2.585	
Total	203.72	31		

The computed value of *F is* 16.94. The *df* for the numerator is 3 and the *df* for the denominator is 28. The table values required for rejection of H_0 are 2.95 at the 5% level and 4.57 at the 1% level. What is your decision? Reject H_0 at the 1% level and conclude that the groups differ significantly. The treatments had an effect on how closely a phobic student would approach a live snake.

2. $\mathrm{LSD}_{.05} = 1.65$; $\mathrm{LSD}_{.01} = 2.22$.

Table of Differences

		Group 3 3.750	Group 2 5.625	Group 1 8.250	Group 4 8.750
Group 3	3.750		1.875*	4.500**	5.000**
Group 2	5.625			2.625**	3.125**
Group 1	8.250				0.500
Group 4	8.750				

Note. $*p < .05$; $**p < .01$.

Conclusion: Group 3, which got both relaxation training and imagery training, had significantly lower behavioral avoidance scores (displayed less fear) than any of the other groups. Group 2 participants, who had imagery training, were significantly less fearful than Groups 1 and 4 participants, who did not differ from each other.

3. $SS_{tot} = 39.28$, $SS_w = 37.92$, $SS_b = 1.36$

ANOVA Summary Table

Source	*SS*	*df*	*MS*	*F*
Between groups	1.36	3	0.453	$F = 0.36$
Within groups	37.92	30	1.264	$F_{crit}(3, 30) = 2.92$ ($p = .05$)
Total	39.28	33		

Thus, $F(3, 30) = 0.36$, $p > .05$. There's no evidence that the sleeping aids affected the speed of sleep onset.

4. $F(2, 21) = 359.54$, $p < .01$. Different levels of preflight illumination had an effect on time to complete dark adaptation.

5. $LSD_{.05} = 2.31$; $LSD_{.01} = 3.14$.

Table of Differences

	Group C 4.50	Group B 9.75	Group A 32.50
Group C 4.50		5.25**	28.00**
Group B 9.75			22.75**
Group A 32.50			

Note. *$p < .05$; **$p < .01$.

Conclusion: All comparisons were significant, with Group C pilots who spent 30 minutes wearing red-tinted goggles having the shortest times to dark adaptation, followed by Group B pilots (30 minutes in a dimly lighted room), and Group A pilots (30 minutes in a bright room).

6. $F(3, 24) = 41.15$, $p < .01$. Mathematics anxiety varied over time in the course.

7. $LSD_{.05} = 0.83$; $LSD_{.01} = 1.12$.

Table of Differences

	9 Weeks 6	6 Weeks 7	3 Weeks 9	First Day 10
9 Weeks 6		1*	3**	4**
6 Weeks 7			2**	3**
3 Weeks 9				1*
First Day 10				

Note. *$p < .05$; **$p < .01$.

Conclusion: All pairwise comparisons were significant, with students showing progressively less math anxiety with passage of time in the course.

8. $F(2, 18) = 40.95$, $p < .01$. Fatigue affected time to assemble pocket calculators.

9. $HSD_{.05} = 0.74$; $HSD_{.01} = 0.96$.

Table of Differences

		Beginning 22.1	Middle 23.1	End 24.7
Beginning	22.1		1.0**	2.6**
Middle	23.1			1.6**
End	24.7			

Note. *$p < .05$; **$p < .01$.

Conclusion: All pairwise comparisons were significant. The average time to assemble pocket calculators got progressively longer as the shift progressed.

10. $F(2, 14) = 17.06$, $p < .01$. The amount of dark adaptation affected the number of object detections.

11. $LSD_{.05} = 1.32$; $LSD_{.01} = 1.84$.

Table of Differences

		1 Minute 2.5	15 Minutes 5.0	30 Minutes 6.0
1 Minute	2.5		2.5**	3.5**
15 Minutes	5.0			1.0
30 Minutes	6.0			

Note. *$p < .05$; **$p < .01$.

Conclusion: Object identification was significantly better after 15 minutes and after 30 minutes in the dark than after 1 minute. There was no significant difference in identification between 15 and 30 minutes in the dark.

12. $F(3, 32) = 0.88$, $p > .05$. The different diets had no effect on errors to learn the visual discrimination task.