

# Answers to additional business exercises

## Chapter 18 One way ANOVA

Conduct a one-way ANOVA with post hoc tests to compare staff satisfaction scores (*totsatis*) across each of the length of service categories (use the *servicegp3* variable).

### Descriptives

totsatis									
	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum	Between-Component Variance
					Lower Bound	Upper Bound			
1 <= 2	172	35.57	6.489	.495	34.59	36.55	19	50	
2 3 - 5	127	33.34	6.558	.582	32.19	34.49	18	48	
3 6+	136	33.18	7.586	.650	31.90	34.47	10	50	
Total	435	34.17	6.947	.333	33.52	34.83	10	50	
Model									
Fixed Effects			6.870	.329	33.53	34.82			
Random Effects				.809	30.69	37.65			1.610

### Test of Homogeneity of Variances

totsatis			
Levene Statistic	df1	df2	Sig.
1.807	2	432	.165

### ANOVA

totsatis					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	557.061	2	278.530	5.902	.003
Within Groups	20387.008	432	47.192		
Total	20944.069	434			

### Robust Tests of Equality of Means

totsatis				
	Statistic <sup>a</sup>	df1	df2	Sig.
Welch	6.111	2	273.364	.003
Brown-Forsythe	5.836	2	400.784	.003

<sup>a</sup>. Asymptotically F distributed.

### Multiple Comparisons

Dependent Variable: totsatis

Tukey HSD

(I) servicegp3 length of service grp 3	(J) servicegp3 length of service grp 3	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1 <= 2	1 <= 2					
	2 3 - 5	2.231*	.804	.016	.34	4.12
	3 6+	2.386*	.788	.007	.53	4.24
2 3 - 5	1 <= 2	-2.231*	.804	.016	-4.12	-.34
	2 3 - 5					
	3 6+	.155	.848	.982	-1.84	2.15
3 6+	1 <= 2	-2.386*	.788	.007	-4.24	-.53
	2 3 - 5	-.155	.848	.982	-2.15	1.84
	3 6+					

\*. The mean difference is significant at the .05 level.

### Homogeneous Subsets

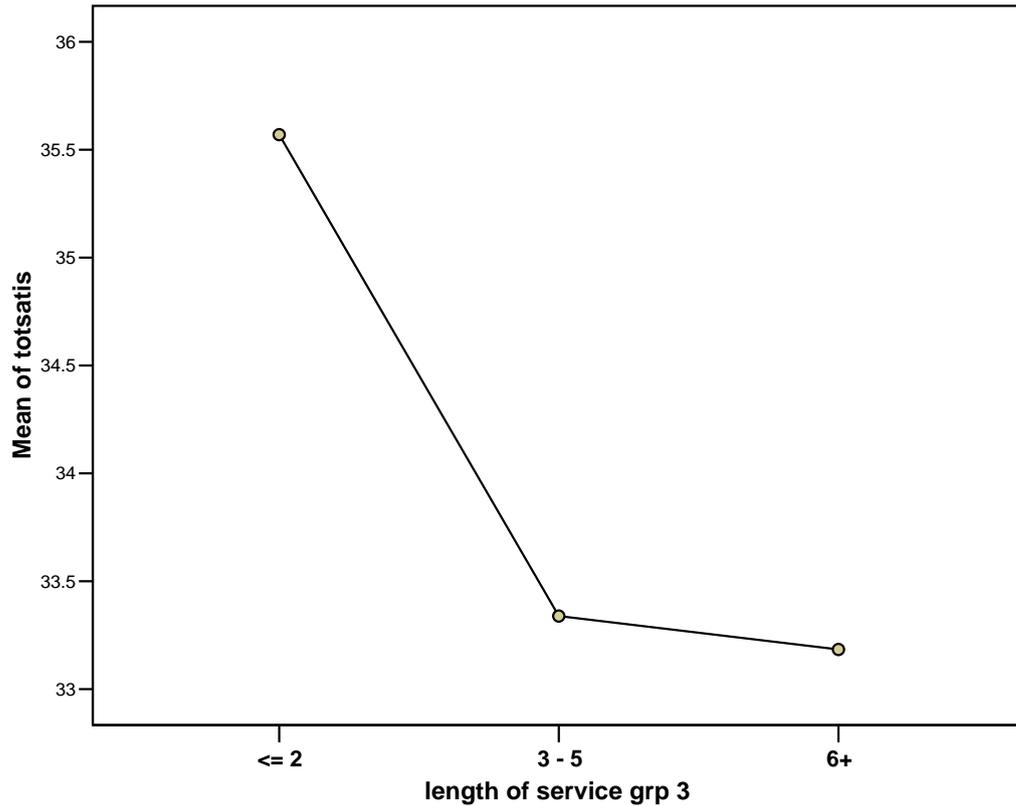
totsatis

Tukey HSD<sup>a,b</sup>

servicegp3 length of service grp 3	N	Subset for alpha = .05	
		1	2
3 6+	136	33.18	
2 3 - 5	127	33.34	
1 <= 2	172		35.57
Sig.		.980	1.000

Means for groups in homogeneous subsets are displayed.

- a. Uses Harmonic Mean Sample Size = 142.579.
- b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.



*A one-way between-groups analysis of variance was conducted to explore the impact of length of service on staff satisfaction levels. Respondents were divided into three groups according to their length of service (Group 1: <= 2yrs; Group 2: 3 to 5yrs; Group 3: 6+yrs). There was a statistically significant difference at the  $p < .05$  level in satisfaction levels for the three service groups [ $F(2, 432) = 5.9, p = .003$ ]. Post-hoc tests using the Tukey HSD test indicated that Group 1 ( $M = 35.57, SD = 6.49$ ) was significantly different to both Group 2 ( $M = 33.34, SD = 6.56$ ) and Group 3 ( $M = 33.18, SD = 7.59$ ). Group 2 and Group 3 differ not differ significantly.*