

## Unit 8 and 9 Statistical Inference Exercises

### Exercise 8.4

t-Test: Paired Two Sample for Means		
	<i>Agent1</i>	<i>Agent2</i>
Mean	8.15	8.54
Variance	1.133888889	1.160444444
Observations	10	10
Pearson Correlation	0.904704895	
Hypothesized Mean Difference	0	
df	9	
t Stat	-2.63671387	
P(T<=t) one-tail	0.01352958	
t Critical one-tail	1.833112933	
P(T<=t) two-tail	0.02705916	
t Critical two-tail	2.262157163	

The sample mean numbers of filtration performance for Agent 1 and Agent 2 were, respectively 8.15 and 8.54. This result suggests that Agent 2 is more effective than Agent 1 by a difference of 0.39. This two-tailed analysis observed related samples  $t = -2.637$  with 9 degrees of freedom. The associated two-tailed p-value is  $p = 0.027$ , so the observed  $t$  is significant at the 5% (two-tailed) level. This analysis suggests that Agent 2 is a more effective filtration agent.

### Exercise 8.5

Applying a one-tailed analysis of the previous dataset disputes this result, with a p-value of 0.014. This result is insignificant at the 1% (one-tailed) level. One-tailed analysis does not suggest that Agent 2 is more effective.

### Exercise 8.6

An initial f-Test did not yield statistically significant results using either the one-tailed p-value, 0.218, or the two-tailed p-value, 0.436. This analysis is shown below.

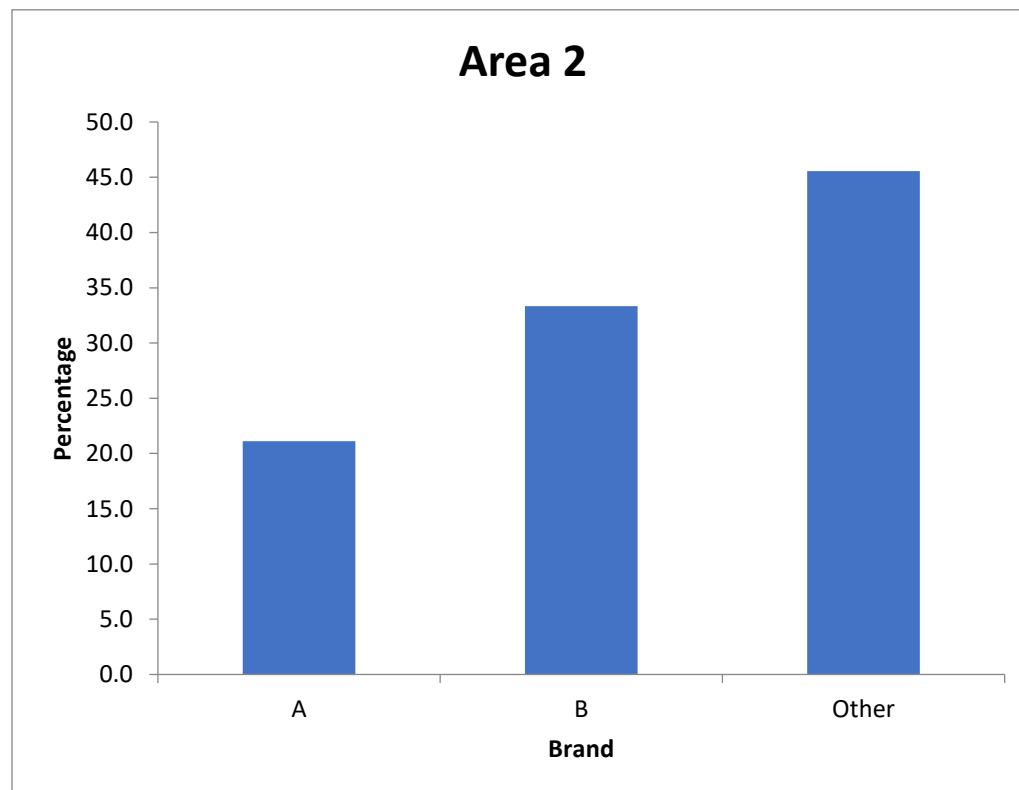
f-Test Two-Sample for Variances		
	<i>M</i>	<i>F</i>
Mean	52.91333333	44.23333333
Variance	233.1289718	190.1758192
Observations	60	60
df	59	59
F	1.225860221	
P(F<=f) one-tail	0.21824624	
F Critical one-tail	1.539956607	

p2 0.43649248

After performing a two-sample t-Test assuming equal variances, p-values for both the one-tailed and two-tailed levels, both approximately 0.001, clearly indicate that the population mean income for males exceeds that of females. This analysis is shown below.

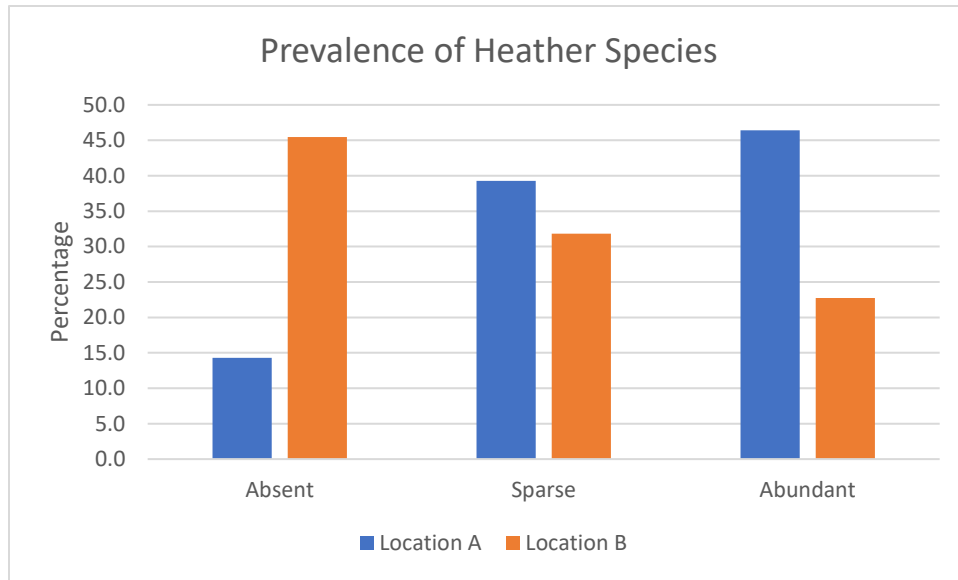
t-Test: Two-Sample Assuming Equal Variances		
	<i>M</i>	<i>F</i>
Mean	52.91333333	44.23333333
Variance	233.1289718	190.1758192
Observations	60	60
Pooled Variance	211.6523955	
Hypothesized Mean Difference	0	
df	118	
t Stat	3.267900001	
P(T<=t) one-tail	0.000709735	
t Critical one-tail	1.657869522	
P(T<=t) two-tail	0.00141947	
t Critical two-tail	1.980272249	

#### Exercise 9



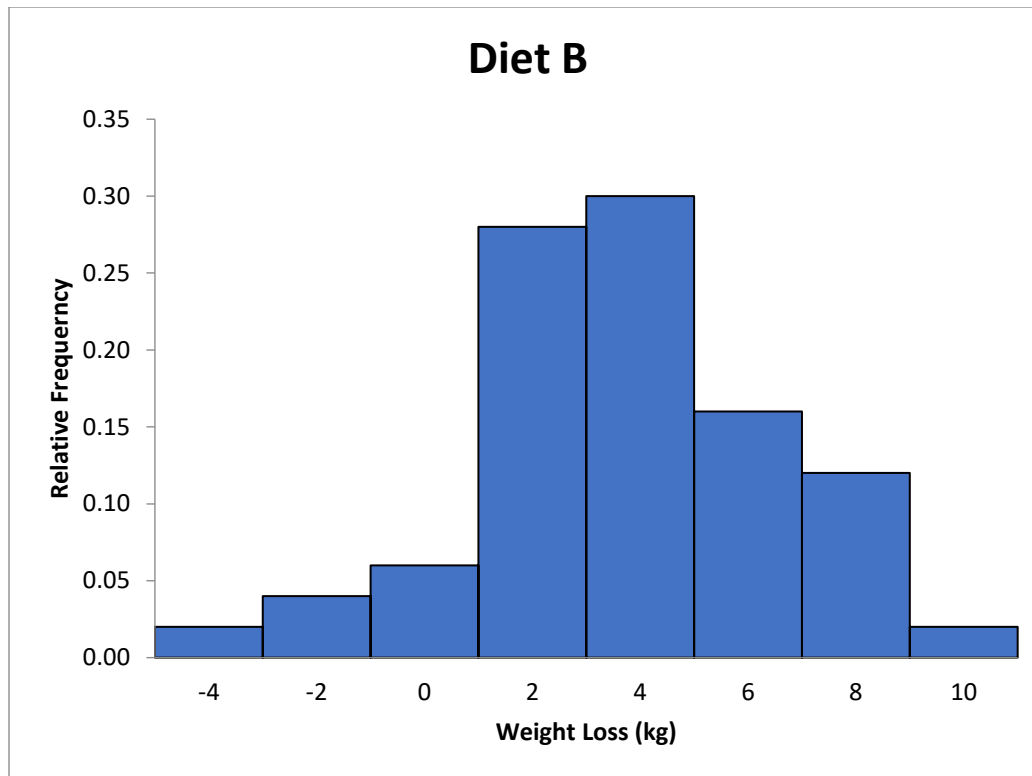
Like Area 1, Area 2 demonstrates a clear preference for Other brands, followed by Brand B, and finally, Brand A. Unlike Area 1, Area 2 has less variance between preferences for Brand A, B, and Other.

### Exercise 9.2



This clustered bar graph depicting the prevalence of heather species in two locations demonstrates an inverse relationship between the locations. This data suggests that the conditions at each location are specific to particular species of heather, and that species may have adapted to characteristics of each location.

### Exercise 9.3



Analysis shows that the distribution of subjects who underwent Diet B is unimodal and slightly symmetrical, with a positive skewness.