**Unit 8 Answer:**

**Exercise 8.1**

Thus, the sample size for Diet B is n = 50 (50 individuals undertook Diet B)

The sample mean weight loss for Diet B is = 3.71. The average weight loss for those individuals who undertook Diet B is 3.71 kg and Diet A is 5 341 kg, so the diet appears to have been Diet A is more effective.

The sample standard deviation of the weight loss for Diet B is s = 2.769 kg. Since the mean weight loss is a little larger than 2s, then a high proportion of those individuals on Diet B had a positive weight loss, again emphasising the effectiveness of the diet.

**Exercise 8.2**

The sample median weight loss for Diet B is M = 3.745 kg, so the diet appears to have been effective.

The sample interquartile range of the weight loss for Diet B is IQR = 3.451 kg. A high proportion of those individuals on Diet B had a positive weight loss, again emphasising the effectiveness of the diet.

**Exercise 8.3**

The percentages able show what share of the brand population and the sample population fall into each area bracket. It is easier to read or understand than the exact numbers.

**Exercise 8.4**

The obtained related samples t = -3.263 with 11 degrees of freedom.

The associated two-tailed p-value is p = 0.0075, so the observed t is significant at the 5% level (two-tailed).

|  |  |  |
| --- | --- | --- |
| t-Test: Paired Two Sample for Means | |  |
|  |  |  |
|  | *Agent1* | *Agent2* |
| Mean | 8.25 | 8.683333333 |
| Variance | 1.059090909 | 1.077878788 |
| Observations | 12 | 12 |
| Pearson Correlation | 0.901055812 |  |
| Hypothesized Mean Difference | 0 |  |
| df | 11 |  |
| t Stat | -3.263938591 |  |
| P(T<=t) one-tail | 0.003772997 |  |
| t Critical one-tail | 1.795884819 |  |
| P(T<=t) two-tail | 0.007545995 |  |
| t Critical two-tail | 2.20098516 |  |
|  |  |  |
| Difference in Means | -0.433333333 |  |

The sample mean numbers of remove impurities for filter Agents 1 and 2 were, respectively 8.25 and 8.68. The data therefore constitute significant evidence that the underlying mean number of remove impurities was greater for Agent 1, by an estimated 8.25 - 8.68 = -0.43 items per batch. The results suggest that Agent 2 should be more effective.

**Exercise 8.5**

The associated one-tailed p-value is p = 0.003, so the observed t is significant at the 1% level (one-tailed).

The data therefore constitute strong evidence (on a one-tailed test) that the underlying mean number of containers sold was greater for Design 1, by an estimated 8.25 - 8.68 = -0.43 items per batch. The results continue to suggest that Agent 2 should be preferred.

Although broadly similar conclusions were reached as before, a higher level of significance was obtained with the one-tailed test.

**Exercise 8.6**

|  |  |  |
| --- | --- | --- |
| F-Test Two-Sample for Variances |  |  |
|  |  |  |
|  | *M* | *F* |
| Mean | 52.913 | 44.233 |
| Variance | 233.129 | 190.176 |
| Observations | 60.000 | 60.000 |
| df | 59.000 | 59.000 |
| F | 1.226 |  |
| P(F<=f) one-tail | 0.218 |  |
| F Critical one-tail | 1.540 |  |

|  |  |
| --- | --- |
| Two-tailed | 0.00141947 |
| One-tailed | 0.000709735 |

The associated two-tailed p-value is p = 0.0014, so the observed t is significant at the 1% level (two-tailed).

The sample mean income for Male and Female were, respectively, £52.913K and £44.233K.

The data therefore constitute strong evidence that the underlying mean income was greater for Male, by an estimated 52.913 - 44.233 = £8.680K. The results strongly reflected that Male has earn more income.